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Three Lines of 60-inch Cast Iron Pipe

Make a liberal allowance for the GROWTH of your city—

install

Cast Iron Pipe

of ample capacity

The only reason for the replacement of Cast Iron Pipe ever given in its two and a half centuries of municipal service has been the outgrowing of its capacity.

There is very little, if any, Cast Iron Pipe in the ground to-day that could not be "scrapped" and sold for more than its original cost — it is made of the only material to which *age gives an appreciated value* — but it is never "scrapped." It is taken up intact and relaid in some less populous section of the city.

With the ever increasing cost of labor, wouldn't it be much better to err slightly on the side of "ample capacity" and save this expense of replacement?

The Cast Iron Pipe Publicity Bureau

1 Broadway, New York

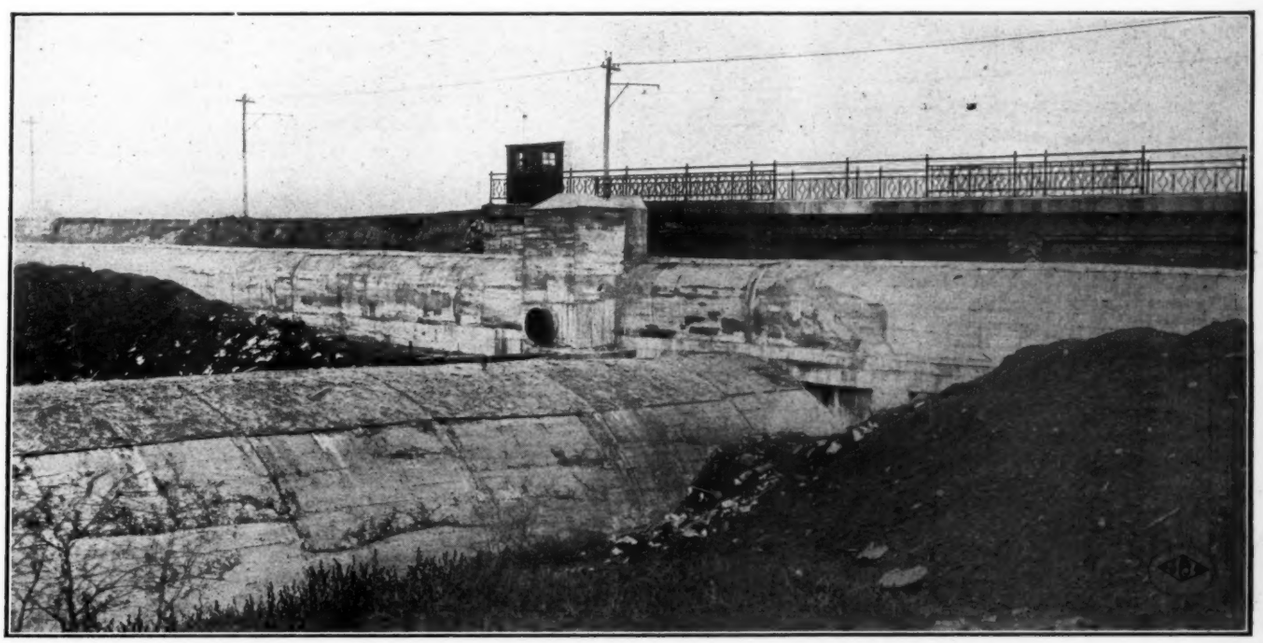
Municipal Journal

Volume XLIV. NEW YORK, MARCH 2, 1918 No. 9

ST. LOUIS' NEW CONCRETE WATER CONDUIT

Provided to Supplement Old Conduit—Methods of Mixing, Placing and Reinforcing Concrete—Creek Crossings Supported on Piles—Equipment Used—Contract Prices.

By W. E. HARDENBURG.



CONDUIT CROSSING HARLEM CREEK SEWER. SHOWING 36-INCH DRAINAGE VALVE.

To increase the conduit capacity between the pumping station at Baden and the intake at Chain-of-Rocks in the Mississippi, the St. Louis water department is just completing a reinforced concrete conduit 3 1/2 miles long at a cost of somewhat over $200,000. This conduit, which possesses several unusual features in its design, was necessary to reinforce the old line, which had a maximum capacity of only about 90,000,000 gallons daily, while the estimated maximum draft in the summer is 102,000,000 gallons. With a storage at the Bissell's Point station of only 60 million gallons, which would be exhausted in about 5 days, the necessity of an additional conduit was clear. The old conduit, which was completed in 1892, is horseshoe in shape, 7 feet 9 inches high and 9 feet wide, with segmental granitoid finished invert, straight brick sides and semi-circular arch of brick, the invert being of concrete and the arch and sides backed with concrete. It is 17,930 feet long, built partly in cut and partly on fill and has a uniform grade of 1 foot in 10,000.

The proportions and reinforcement of the new conduit are fully shown on the accompanying drawing. This design was adopted only after estimates on many other types of conduit had demonstrated its economy under prevailing labor and material prices.

The new conduit parallels the old one, lying along the west side of it and with one wall built against it, except on the city property at Bissell's Point, where the two are 25 1/2 feet apart on centers. The new conduit, however, has a grade of 1 foot in 5,000 feet, and will carry 60,000,000 gallons of water a day when the old one carries 80,000,000. With the basins low, the combined capacity will be 160,000,000 gallons daily.

The new structure is connected with the old one at the Baden gate chamber (which is being enlarged and reconstructed), at the terminal chamber at Bissell's Point, and at the basins into which both empty. In addition, it is connected to a conduit supplying water from the basins at Bissell's Point to two high service pumping stations.

In its course, the conduit passes underneath the tracks of the Water Works' Railway, a municipal line running from Bissell's Point to Baden on a course roughly paralleling that of the conduit. The crossing is made underneath a reinforced concrete culvert, constructed in advance of the arrival of the conduit at that point.

Two gullies, Harlem and Horse creeks, each about 100 feet wide and each marking the course of a sewer, also were crossed by the conduit. The sewer at Harlem Creek is 17 by 30 feet; that at Horse Creek, 12 feet. In each case, the conduit is supported by a platform consisting of three staggered rows of reinforced concrete piles, the 20 odd piles in each row being spaced 10 feet apart, center to center, and the rows being 3 feet 3 inches apart, center to center. The interstices between the piles were packed with earth.

The piles averaged 15 inches in diameter and were driven to bed rock, the depth varying from 12 to 23 feet. The reinforcement consisted of six 5/8 inch longitudinal steel bars, stayed at intervals of 4 feet with circular bands of strap iron 1 by 1/4 inches and with a spiral wrapping of No. 10 steel wire with a pitch of 4 inches center to center, except at the head and point of the pile, where the pitch was reduced to 1 inch. The bars were 1 foot less than the overall length of the pile. The piles were driven in place with a No. 2 Vulcan steam hammer. Refusal was taken to mean more than 20 blows per inch.

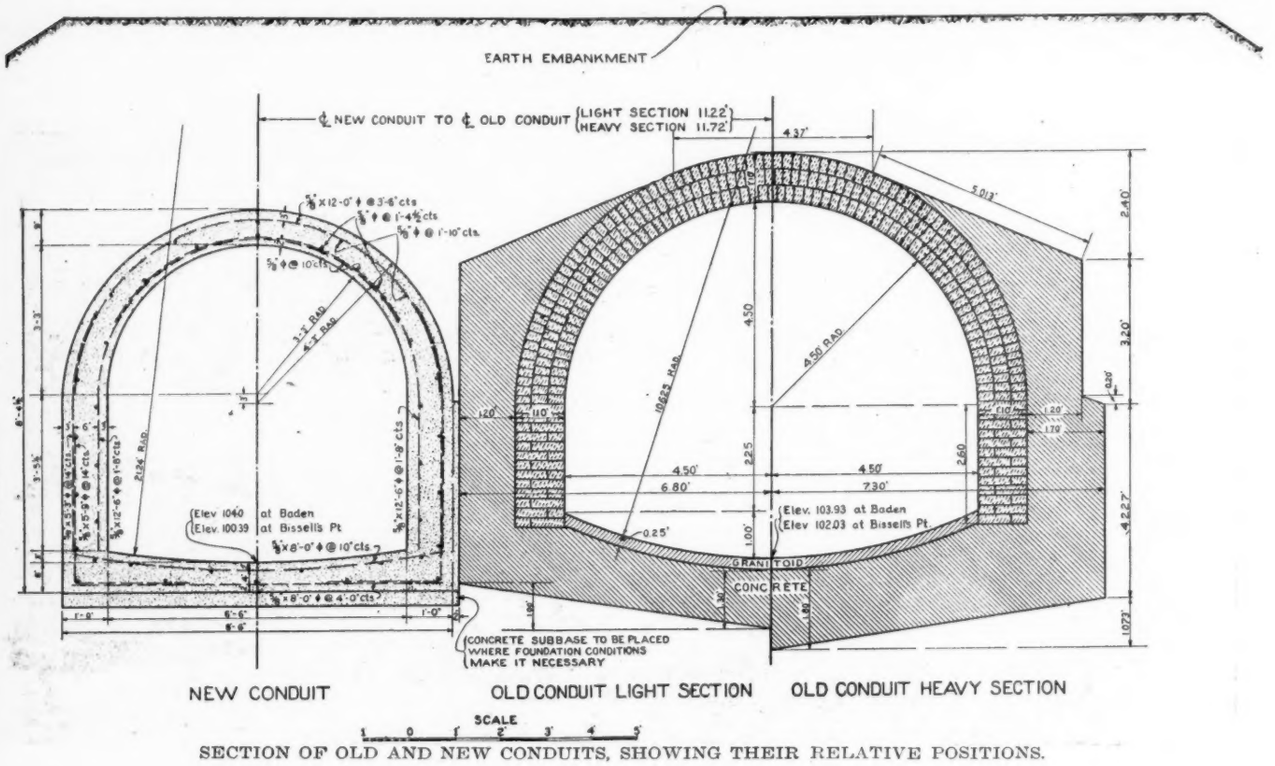
The concrete for the piles was a 1:4 1/2 mix, except for two feet at the top and at the base of the pile, where it was enriched to 1:3 1/2. In all cases the piles were seasoned 30 days before being used.

The concrete in the conduit proper, except that used in laying subbase, etc., was composed of one part of standard Portland cement to a mixture of sand and aggregates of such proportion that one sack of cement was used in 4 1/2 cubic feet of concrete. The proportion of sand and gravel or crushed rock used varied, the mixture being generally 2 parts of sand to 4 1/2 of gravel. Ten pounds of hydrated lime were added for each sack of cement.

A rather wet mix was used, the specifications providing that it be mixed wet enough to require no ramming. The ingredients were mixed for three minutes, after all had been placed in the machine. After it was poured, the concrete was kept moist seven days. In pouring the concrete, great care was taken to maintain at all times not less than 2 inches of concrete between the centers of the outer reinforcing bars and the nearest bounding surface of the concrete.

The specifications for the reinforcing steel provided that the bars be rolled from either billet stock or sound rails (rails not to be used for bars more than 1 inch in diameter) and be deformed throughout their entire length while being rolled. The efficiency of the deformation was tested by embedding a specimen bar 5 inches in 1-2-4 concrete. It was required that, after 28 days, the bar sustain a load of 225 pounds per square inch of imbedded surface.

Each sample had to exhibit the following physical characteristics: Elastic limit, 50,000 pounds per square inch calculated on the specific section of the bar; cold bend, for bars under 3/4 inches, 180 degrees, and for bars 3/4 inches and over, 90 degrees, about a pin whose diameter is equal to 4 times the diameter of the specimen; elongation, minimum per cent in 8 inches, $\frac{1{,}000{,}000}{\text{ultimate strength}}$.



SECTION OF OLD AND NEW CONDUITS, SHOWING THEIR RELATIVE POSITIONS.

The concrete plant employed by the contractor consisted of two Ransome mixers of 1 yard capacity each and a Smith mixer with a capacity of 3/4 yard. The material was brought to the site of the plant over the railway along a switch paralleling the conduit and the concrete was shot directly into the forms. Horizontal layers of concrete in sections between 50 and 100 feet long, depending upon facilities at the different points, were poured at a time. At the end of each section, the concrete was stopped by a vertical bulkhead. On an average, 30 feet of completed conduit were laid per day, the highest figure reached being 400 lineal feet in a week, at a time when weather and labor conditions were favorable.

Special care was taken at all times to insure that the surfaces generally were smooth and free from both indentations and projections, while all exposed chamber sur-

faces were given a finish 1/2 inch thick, composed of 1 part of cement and 2 parts of sand, this finish being poured with the concrete.

The forms used in constructing the conduit along most of its length were Blaw metal forms. In short, curved sections, however, hand-made wooden forms of tongue and grooved timber, covered with sheet iron, were employed.

A considerable amount of masonry removal was required at the connections to the Baden gate chamber and the terminal chamber, the engine house conduit and the storage basin at Bissell's Point. The greater part of this masonry was limestone and brick, the engine house conduit being the principal reinforced concrete construction. Great care was required in this work, owing to the fact that it was necessary to keep the old conduit and the conduit chambers in service most of the time, only 4-hour periods being allowed for the placing of the bulkheads, stop planks, baffles, etc., and for their removal. Blasting was entirely prohibited, all the removal being done by drilling and the use of plug and feather and sledging. At several places the masonry on the west side of the old conduit projected into the new conduit wall more than 3 inches, the maximum permitted, and in these cases it was necessary to trim it down.

Though it had been expected that leakage would cause considerable trouble in excavating, little was found. The few leaks found in the old conduit were soon plugged. Heavy rains were the worst handicap, but in all cases a few small hand pumps furnished ample dewatering capacity.

Little difficulty was experienced in the excavation, the soil being uniformly a soft loam, mostly river deposit. For the excavation, a clamshell digger with a capacity of 100 cubic yards a day and operated by four men was employed, the average excavation per day being from 75 to 80 cubic yards. Excavation was not generally carried more than 50 feet ahead of the concrete, as a precaution against movement of the ground under the old conduit. When deemed necessary, wooden sheet piling was driven along the sides of the old conduit to insure against any such movement, this piling generally being left in place.

The back-filling was done by a drag scraper operated by 3 men, the conduit being covered to a depth of 3 feet on the average.

The embankment required was chiefly at Harlem and Horse creeks and at Bissell's Point. A large proportion of the embankment was made from the material excavated from nearby portions of the line. The free haul limit was 500 feet. The earth was hauled for the most part by wheel and drag scrapers, though wagons were used in some places.

The completed conduit, including the chambers and connections, was tested in sections of approximately 1,500 feet by filling with water under varying heads, in no case exceeding 5 feet above the top of the intrados, allowing it to stand and noting the leakage. The maximum leakage permissible was 3 gallons in 24 hours per lineal foot of conduit. The water for the testing was pumped from the old conduit, which has manholes at intervals of about 1,500 feet.

The gates were tested in place by applying full pressure alternately in either direction; the maximum allowable leakage with full pressure on the gate side being 5 gallons per minute, and with full pressure on the other side, 10 gallons per minute.

All the gate chambers are carried on reinforced concrete piles driven to bed rock, similar to those already described as being employed at the creek crossings.

At the Baden gate chamber, a 3 by 5-foot double gate previously in use was removed and a new 4 by 6-foot double gate substituted for it. Gates put in at Bissell's Point included a 6 by 7-foot, a 6 1/2 by 7-foot and a 3-foot circular gate, all being hand-operated. The gates were made by the Flower-Stevens Company of Detroit.

CONSTRUCTION VIEW OF NEW CONDUIT.

The city rendered considerable assistance to the contractor in the transportation of supplies and equipment. Between the hours of 8:15 a. m. and 4:45 p. m. of every working day, free haulage service on the Water Works' Railway was given to as great an extent as possible without interfering with regular traffic on the railway. All switches and sidings were supplied by the contractor.

The contract, which amounted to $232,172.50, was awarded to the Hagan Construction Company, a St. Louis concern. The official estimates of the work to be done and the material to be supplied, together with the contract prices for each follow:

Description	Quantities	Price
Earth Excavation.....	84,100 Cu. Yards..	$0.45
Embankment	3,350 " " ..	.45
Masonry Removal.....	90 " " ..	10.00
Concrete not Reinforced...	1,900 " " ..	6.00
Concrete in Conduit.....	15,850 " " ..	6.00
Concrete in Chambers, etc.	950 " " ..	8.00
Additional Portland Cement	100 Barrels.....	1.70
Reinforcing Steel.....	1,800,000 Pounds.....	.035
Sluice Gates and Appurtenances	Complete	5,800.00
Miscellaneous Cast Iron and Steel	55,000 Pounds.....	.07
Reinforced Concrete Piles.	2,500 Lineal Feet.	2.00

Work was begun in September, 1916, and the job will be completed by spring, though shortage of labor and materials is delaying operations considerably.

Gurdon G. Black, engineer in charge of the Supply and Purifying Section of the St. Louis Water Division, directed the work under the supervision of Edward E. Wall, water commissioner.

MOTOR TRUCK ROUTES IN OHIO.

It is probable that early this spring motor truck lines will be in regular operation between Detroit and Cincinnati and between Chicago and Cleveland, the two routes intersecting at Toledo, which will be the headquarters of the company that is planning to operate the lines. The company proposes to put 50 trucks into the service at once and to add 100 more within 90 days if

the patronage warrants it. It is believed that a regular service can be conducted covering the distance from Detroit to Toledo in 6 hours, from Toledo to Cincinnati in 18 hours, Cleveland to Toledo in 12 hours and Toledo to Chicago in 24 hours. All kinds of parcels will be carried and it is reported that traffic managers of a number of large concerns in the several cities have promised to patronize this service.

SERVICE STRENGTH OF SEWER PIPE*

Standard Methods for Testing Strength of Pipe to Resist Pressure from Back-Filling—Sand, Two-Point and Three-Point Bearings.

A standard method for testing the "ordinary supporting strength" of sewer pipe is needed urgently, in order that strength test results may be comparable everywhere, and in order that engineers may be able to determine before hand, by standard tests of sample pipe, whether the sewer pipe they are to use in any particular case will be strong enough to carry the loads from the ditch-filling.

The three main points which must be determined in devising a satisfactory standard test of the "ordinary supporting strength" of sewer pipe are:

1. What lengths of hub-and-spigot sewer pipe shall be used in calculating the "ordinary supporting strength" (per unit of length) from the test cracking load on the whole pipe.

2. What formulas and what sewer pipe dimensions shall be used in calculating the modulus of rupture of the pipe.

3. What bearings shall be used in applying the loads in making tests of the "ordinary supporting strength" of sewer pipe, and what are the ratios between the results obtained with the different bearings.

*Continued from page 168.

The net inside length of hub sewer pipe, from the bottom of the hub-socket to the extremity of the spigot end (excluding the hub), should be used as the divisor in calculating the "ordinary supporting strength" (per unit of length) from the test cracking load on the whole pipe.

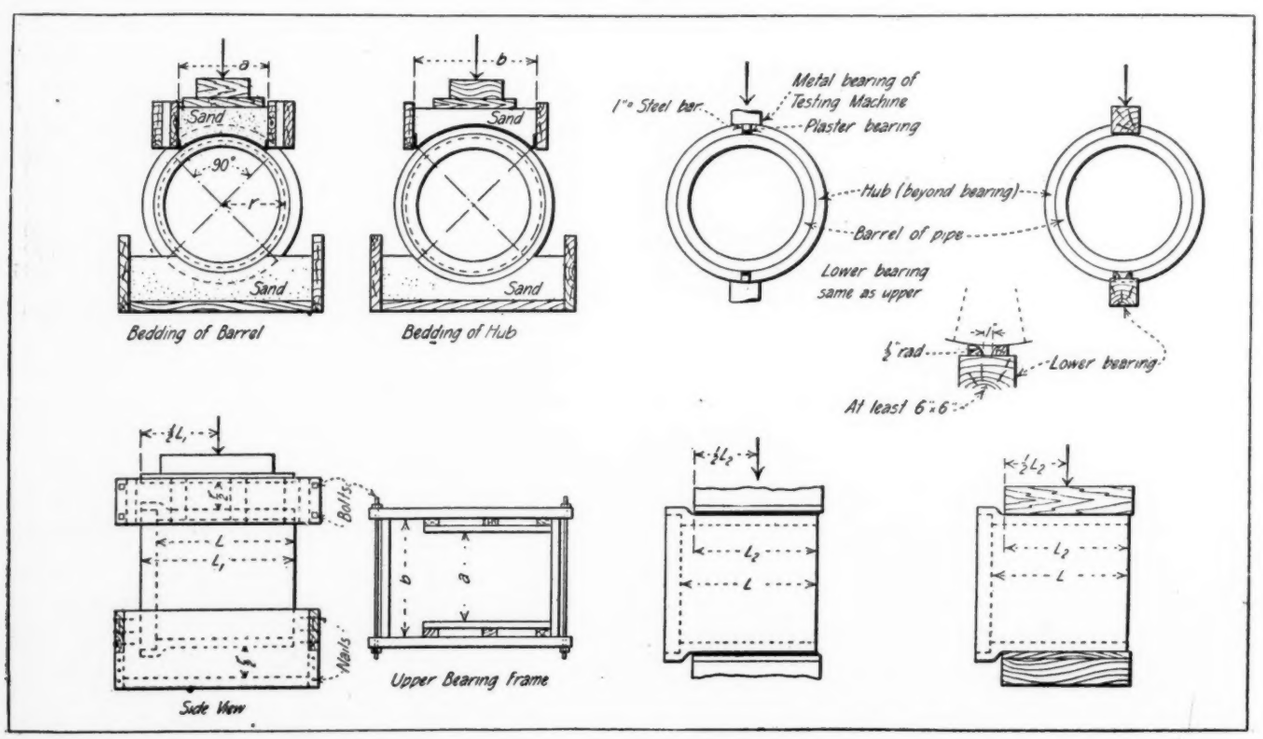
The standard dimensions for hubs of sewer pipe ought to be such as will make the supporting strengths of the hubs (per unit of length) somewhat greater than those of the barrels.

The modulus of rupture of sewer pipe ought to be calculated for the barrel of the pipe alone (excluding the hub), from its "ordinary supporting strength." (Formulas for calculating the modulus of rupture of sewer pipe from the "ordinary supporting strength" are given and fully explained.) Three types of bearings are in common use in making tests of the supporting strength of sewer pipe, and are designated, respectively, "sand" bearings," "two-point" bearings, and "three-point" bearings.

With "sand" bearings the sewer pipe is bedded for the tests (hub and all) in sand above and below for 90 degrees of the circumference of the barrel. This imitates closely the actual ditch-loading conditions. "Sand" bearings (with two other bearings) have been adopted by the American Society for Testing Materials since 1914 as standard for tests of the "ordinary supporting strength" of drain tile, and have been used for sewer pipe also in various laboratories, especially those of the Iowa Engineering Experiment Station at Ames, Iowa.

With "two-point" bearings, the load is applied through steel bars to strips one inch wide above and below the center line of the sewer pipe, with plaster of Paris between the steel bars and the pipe. The hub of the pipe is not loaded at all with this bearing. "Two-point" bearings have been used extensively in testing sewer pipe for the city of Brooklyn, New York.

With "three-point" bearings, the load is applied to the top of the sewer pipe along a line over the center by means of a 6 inch by 6 inch wooden beam, and the pipe is



Sand Bearings. Two-point Bearings. Three-point Bearings.

BEARINGS RECOMMENDED FOR USE IN TESTS OF SUPPORTING STRENGTH OF PIPE.

supported below on two wooden strips, 1 inch apart in the clear, with rounded corners. "Three-point" bearings were devised by Professor A. N. Talbot, of the University of Illinois, and (with two other bearings) have been adopted by the American Society for Testing Materials since 1914 as a standard for drain tile. They have been used for sewer pipe also by several laboratories.

Two extensive series of comparative tests of the "ordinary supporting strength" of sewer pipe have been made at Ames, Iowa, by the Iowa Engineering Experiment Station, with "sand" bearings and "three-point" bearings, and "two-point" bearings also were used in the second series.

Tests with "sand" bearings, "two-point" bearings and "three-point" bearings are equally reliable so far as definiteness and uniformity of results are concerned, as is proven by studying the variations from the average and the proportions of regular breaks.

Tests with "sand" bearings gave direct, without the use of any multiplication factor, the "ordinary supporting strength" (which would be developed by the same quality of pipe in actual ditches with the "ordinary" pipe-laying method).

The cracking loads in tests with "three-point" bearings must be multiplied by 10/7 in computing the "ordinary supporting strength." In individual tests this ratio may vary quite a little, but the value 10/7 is well established by averages of a large number of comparative tests.

The cracking loads in tests with "two-point" bearings must probably be multiplied by 10/7 in computing the "ordinary supporting strength"; not enough comparative tests have been made to establish this multiplication factor conclusively, and those made give a somewhat lower average than 10/7, but this value is recommended, partly because of the general similarity of "two-point" and "three-point" bearings.

Standard specifications for tests of the "ordinary supporting strengths" of sewer pipe should permit the optional use of "sand" bearings, "two-point" bearings and "three-point" bearings.

"Sand" bearings have the advantages of reproducing the actual ditch loading conditions as nearly as practicable in a laboratory test, and of giving the "ordinary supporting strength" of the pipe directly, and probably with greater certainty.

"Two-point" bearings and "three-point" bearings have the advantage of greater rapidity and convenience in the laboratory, and the "ordinary supporting strength" of pipe tested can be obtained approximately by applying the multiplication factor 10/7 to the results.

Specifications of the American Society for Testing Materials for "sand" bearings for testing sewer pipe are as follows:

When "sand" bearings are used, the ends of each specimen of sewer pipe shall be accurately marked in quarters of the circumference prior to the test. Specimens shall be carefully bedded for the full length of the sewer pipe, including the hubs, above and below, in sand, for one-fourth of the circumference of the barrel of the sewer pipe, measured on the middle line of the wall, bedding the hub to the same level as the barrel.

The depth of bedding above and below the barrel of the sewer pipe at the thinnest points shall be one-half the radius of the middle line of the wall.

The sand used shall be clean, and shall be such as will pass a No. 4 screen.

The top bearing frame shall not be allowed to come in contact with the sewer pipe nor with the top bearing plate. The upper surface of the sand in the top bearing shall be struck level with a straight edge, and shall be covered with a rigid top bearing plate, with lower surface a true plane, made of heavy timbers or other rigid material, capable of distributing the test load uniformly without appreciable bending. The test load shall be applied to the exact center of this top bearing plate, in such a manner as to permit free motion of the plate in all directions. For this purpose a spherical bearing is preferred, but two rollers at right angles may be used. The test may be made without the use of a testing machine, by piling weights directly on a platform resting on the top bearing plate, provided, however, that the weight shall be piled symmetrically about a vertical line through the center of the sewer pipe, and that the platform shall not be allowed to touch the top bearing frame.

The frames of the top and bottom bearings shall be made of timbers so heavy as to avoid appreciable bending by the side pressure of the sand. The interior surfaces of the frames shall be dressed. No frame shall come in contact with the sewer pipe during the test. A strip of cloth may, if desired, be attached to the inside of the upper frame on each side, along the lower edge, to prevent the escape of sand between the frame and the sewer pipe.

Tests made on vitrified clay sewer pipe at Ames, using sand bearings, gave the following results in pounds per lineal foot of barrel: 12-inch single-strength pipe (from Des Moines, Iowa); average—2,890, maximum—3,865, minimum—2,230. 24-inch single-strength pipe (from Des Moines); average—3,150, maximum—3,535, minimum—2,620.

Other tests on two makes of pipe, and on both standard thickness and double-strength, gave the following results: 18-inch pipe from Macomb, Ill.; standard—1,815 average, double-strength 2,600 average. 18-inch pipe from St. Louis, Mo.; standard—3,080 average, double-strength—4,100 average. 12-inch pipe from Macomb, standard—1,720 average. 6-inch pipe from Macomb—1,970 average.

MOTORCYCLE POLICE SUB-STATION.

The city of Detroit two or three months ago erected, as a sub-station of the Police Department, a small building known as a booth for the use of motorcycle police who are employed in guarding the outlying districts of the city. The first booth proved so valuable that the immediate erection of eleven more was decided upon. Six motorcycle police are detailed for duty at each booth, with two on duty during each of three 8-hour shifts. The two officers alternate with one another for two hours in patrolling the district and in answering emergency calls at the booth.

The outside dimensions of the booth are 8 by 10 feet, with an inside height of 8½ feet in the clear to the ceiling. A space 4 by 4 feet is enclosed for supplies, such as gasoline, oil, etc. The building is heated by means of an oil-heater. One of these booths is shown in the accompanying illustration. The "Gar. 1111" is the telephone number of the booth.

MOTORCYCLE POLICE BOOTH IN DETROIT.

STREET LIGHTING IN 1917*

Review of Developments in the Art and Practice—Illustrations from More Than Twenty Cities in All Sections of the Country.

Data obtained from twenty-six American cities indicate that lighting for illumination produced by units of moderate intensity and spaced so as to produce an even and continuous lighting effect is coming strongly into favor and replacing beacon or spectacular lighting by high-power units placed at considerable distances apart and usually high above the street or sidewalk level. Reports from more than 200 cities of the country, mostly those of small population, have been compiled[1] to show the progress in the adoption of modern machinery and types of lamps used in street lighting.

The reports of the Massachusetts Gas and Electric Light Commission may be taken as representative of street lighting practice in New England and indicate that changes are being made along the lines of the utilization of the smaller and more flexible types of illuminants. The advent of the gas-filled tungsten lamp has made available a line of lighting units flexibly rated from the smallest size to the largest size demanded and operating at an efficiency consistent with the size of the units. An analysis of practice in 110 New England towns, including some in Massachusetts, shows an increase in the use of magnetite arc lamps. The present number of carbon arc lamps is only one-third that of a few years ago, while the number of magnetites has nearly doubled. An increase has been noted also in the number of tungsten lamps below the 250-watt size. In fact, with the general increased use of the gas-filled tungsten lamp the ordinary enclosed carbon arc lamp has vanished to such an extent as to indicate its complete replacement either with the luminous arc lamps or the tungstens.

Attention has been called to the fact that more consideration should be given in street lighting to the effect of glassware and supporting fixtures, wires and poles, on the appearance of the street. In the past, most of the effort in street illumination has been directed toward improving the illumination in intensity and distribution and the production of more artistic standards. But in many cases, sources must be suspended and the location of the supporting wires and poles, the straightness of the latter and the lines of the former have not received much consideration from the standpoint of the looks or the artistic appearance of the street.

The trend of practice throughout the country may be gathered by reference to some of the following recent installations:

Spokane, Wash.—One hundred and twenty blocks are included in the new[2] lighting system in which magnetic arcs are replacing the old carbon arcs, about 500 lamps being involved.

San Francisco, Cal.—Just ten months after the lights were turned off at the exposition grounds, some of the same lamps were turned on when this city celebrated the inauguration of the new lighting system on Market street with an illumination parade. Nearly 9,000 feet of streets in a business section to be known as the Triangle District are to be lighted by luminous arcs mounted two to a standard, the latter to be ornamental in design and fitted with San Francisco gold carrara glassware. In Golden Gate Park, 112 25-foot wooden standards, designed to represent metal or concrete and carrying one 400-candlepower lamp with a bowl refractor, have been installed. Almost all of the old alternating current series arc lamps have been replaced throughout the city with gas-filled tungsten lamps fitted with band refractors. These new lamps have made it possible to grade the illumination to suit the location by the use of 250, 400 and 600-candlepower sizes.

Los Angeles, Cal.—For a new installation on eleven blocks of one of the main business streets it is proposed[3] to use two designs of lighting standards alternating in pairs. The system of lighting recommended uses luminous arcs spaced 115 feet apart, at an approximate elevation of 25 feet, where they will not interfere with window or sign lighting either by simultaneous contrast or otherwise. It has been aimed to combine modern flood-lighting and utilitarian results with a slight suggestion of the Carnival. The soft tone of the glassware specified will be much less insistent than the present white glassware. The installation of ornamental lighting posts on the road leading up to Mt. Wilson has been decided on.

San Diego, Cal.—All arc lamps have been replaced with incandescent tungsten lamps of the gas-filled type, and of these there are 979 of the 600-candlepower size, used with refractors. The business district is illuminated by 539 five- and seven-light electroliers, containing 3,255 multiple tungsten lamps of the 60- and 100-watt size, and 159 single-light electroliers, containing 250-watt gas-filled tungsten lamps.

Salt Lake City, Utah.—The new "white way" lighting has been put in operation for a distance of five blocks covering the entire retail business district of one of the main streets. There are seven standards to the block on each side of the street approximately 100 feet apart. Each standard carries three 6.6-ampere inverted type luminous arc lamps. The lamps are equipped with diffusing glassware.

Kansas City, Mo.—An ordinance has been passed calling for the replacement of gas lamps with 250-candlepower gas-filled tungsten lamps, about 1,400 of which will be needed. The street lighting is to be extended to outlying sections of the city.

Denver, Colo.—In this city, ordinances have been submitted to the City Council for an ornamental system on 14th street, and for the installation of 274 new street lamps in the Park Hill district. In addition, two miles of new lighting are to be placed in the municipal parks. In order to add to the beauty of the business district, a bank has erected at its own expense a very ornamental lighting standard in front of its quarters.

Roundup, Mont.—A street lighting installation which is claimed to be typical of modern practice in the smaller communities in the West has been put in at Roundup. The series incandescent system is employed there, using 51 five-light cluster posts in the business section and 207 single-light posts in the residential district. One 100-candlepower and four 60-candlepower, 6.6-ampere lamps are used with the cluster poles, while 100-candlepower lamps are used with the single-light standards. In the business district the posts are spaced 91.5 feet apart, four to the block. In the residential section the staggered arrangement, with 122 feet between posts, is used.

At Minneapolis, Minn., at Milwaukee, Wis., and at Waco, Tex., additional improvements have been made in the street lighting.

Brownwood, Tex.—The plan of the business section and the consequent expense not warranting a "white way," a novel method of illumination was adopted. The store buildings have in most cases 25-foot fronts and the lights were hung under the awnings on 25-foot centers. A standard unit was adopted consisting of a 100-watt gas-filled tungsten lamp enclosed in an opal ball

*Part of a report by the Committee on Progress of the Illuminating Engineering Society.

[1]Municipal Jour., June 21, 1917, p. 811.

[2]Municipal Jour., Oct. 26, 1916, p. 520.

[3]Municipal Jour., May 10, 1917, p. 659.

and hung from a weatherproof holder. Nearly 400 lamps were installed.

St. Louis, Mo.—In the report of the "Proceedings" of the 1916 convention of the American Gas Institute will be found a very good description of the extensive use of gas for street lighting in St. Louis as well as references to gas street lighting in Philadelphia, Baltimore, Charlestown, S. C., and Milwaukee, Wis.

Chicago, Ill.—In general, the extensions provided for by the big bond issue last year are being carried out, special attention being paid to four districts in particular. Two types of lighting equipment are being used: for business and car-line streets, 600-candlepower lamps mounted 22 feet above the street surface; for well developed residential streets where there are many trees, 100-candlepower lamps with low mounting height. All lamps are of the gas-filled tungsten type and those in the residential districts will be operated on low voltage as a precautionary measure. An interesting example of co-operation between property owners and the city to improve the street lighting is to be found in an installation on one of the business streets covering a distance of half a mile. This section was formerly lighted by 20 of the standard flame-arc lights supplied by the city. The property owners' association added 40 of the 500-watt gas-filled tungsten lamps in fixtures designed to conform with those of the arc lamps.

Additions to the boulevard and park systems are being made that will cover 8.75 miles. On the 5 miles of Michigan avenue which will be relighted, 320 double lanterns on cast-iron standards will be used. Four standards will be placed on the corners of each street intersection. Between the corners the posts will be staggered, allowing future expansion.

It is expected that by the time this report is presented the work throughout the city of making the change from arc lamps to the gas-filled tungsten units will be completed. The latter are of the 10-ampere street series, 600-candlepower, 6,000-lumen type, mounted on cast-iron fixtures in which special attention has been paid to the film cutout in the socket. Owing to the increased cost of tubular steel poles and the uncertainty of the time element in delivery, the city is considering a change from the standardized type of street lighting pole to an "equivalent" pole defined as "expanded steel-truss poles or concrete poles which may in the judgment of the commission * * * be equivalent."

New Orleans, La.—Installation of the new lighting system is under way. A specially designed ornamental street-lighting post has been made. Each post carries a 7.5-ampere, 250-candlepower tungsten lamp in a 16-inch globe. The posts measure 10 feet 10 inches in height, and will be spaced 90 feet apart. About 2,000 of these fixtures will be used on sections of the boulevards and principal avenues of the city. In the business section, double-lamp standards will be installed. Magnetite arc lamps, rated at 5.5 amperes, will also be used throughout the city, about 4,000 being planned for.

Elkhart, Ind.—A new street-lighting system has been installed. Single-lamp units are used of the reflector-refractor type, suspended 24 feet above the street and spaced about 15 feet apart.

Cincinnati, O.—Bids have been asked for the installation and equipment on 13 streets involving some 14 miles of new lighting. Nine hundred and thirteen incandescent lamps will be installed of the 20-ampere, gas-filled tungsten type, replacing 294 old arc lamps.

Springfield, O.—A new cluster light system has been installed,[4] consisting of 317 posts, and covering a distance of approximately 3 miles.

[4]Municipal Jour., Dec. 28, 1916, p. 814.

Titusville, Pa.—Since the series type of incandescent lamps would compel less change from the old carbon open-arc system, 150 of the 400-candlepower and 28 of the 600-candlepower tungsten units have been installed. One hundred and twelve units are supported on mast arms and the remainder on center suspensions.

Philadelphia, Pa.—The work of substituting gas for gasoline in more than 11,000 street lamps has been completed. The installation of 308 series, twin, electric arc lamps on Broad street completes the lighting of 8 miles of this thoroughfare comprising the entire paved portion. One hundred and fifty-seven lamp standards, each carrying a 100-candlepower series incandescent tungsten lamp, have been placed on the Southern Boulevard.

New Haven, Conn.—Fourteen ornamental gas lamps have been added to the lighting system.

New York City, N. Y.—At the end of 1916, 2,808 miles of streets and 10 square miles of parks were being lighted[5] by means of 78,540 street lamps. All arc lamps have been replaced, as well as 28,500 gas lamps and 1,292 naphtha lamps, by electric incandescent lamps of the best type.

Brooklyn, N. Y.—In the Ridgewood section, 1,000-candlepower series incandescent lamps suspended over the roadway and equipped with 10-inch band refractors are used at the street corners. Owing to the length of the blocks, 700 feet, 100-candlepower lamps with 8.5-inch band refractors have been placed at mid-block positions. In other sections of the city the wooden poles and overhead style of construction, for 60-cycle series lighting, will be replaced by iron posts with the cable carried underground.

Hoboken, N. J.—The new flaming-arc street-lighting system in the business section was placed in regular service in October. A new incandescent system comprising an installation of about 500 lamps was also officially opened in that month.

Baltimore, Md.—In the residential districts arc lamps are being replaced with ornamental gas lamps. This is in accordance with a plan to equip streets outside the business district with a standard lamp and remove the glare effect from residences.

Washington, D. C.—One hundred and seventy-seven of the 100-candlepower incandescent lamps have been installed with the improved type of post in the city proper, while 143 of the 60-candlepower size have been placed in the outlying districts. One hundred and forty-four mantle gas-lamps have also been added. A complete system of incandescent lighting has been installed on Maryland avenue.

Roanoke, Va.—A new lighting system has been put in[6] in which 430 of the old type of carbon arcs have been replaced by 800 gas-filled tungsten units.

Lincoln Highway.—A movement to light the entire extent of the Highway is being agitated among the Jovian Leagues.

Vancouver, B. C.—The old arc lamp fittings have been used to hold gas-filled tungsten lamps installed in place of the arc system. Six-hundred-candlepower lamps are used on car-line streets while on other residential streets the lamps are of the 400-candlepower size.

In England the war conditions due to restricted lighting have delayed the change, which had started before the war, from arc lamps to gas-filled tungsten lamps.

Edinburgh, Scotland.—The Covener of the Cleaning and Lighting Commission of the Edinburgh Town Council reported the success of a number of experimental tests with a pressure-wave system for automatically lighting and extinguishing the public lamps. As a result an initial equipment was placed on 65 lamps, and the effect

[5]Municipal Jour., April 5, 1917, p. 500.
[6]Municipal Jour., May 31, 1917, p. 746.

was so satisfactory that it was recommended to the Town Council that 300 more be included. It is hoped by the use of this system to put gas-lighted areas on the same basis as those electrically lighted in enabling lamps to be quickly extinguished in case of air raids. Experiments have been made also in the direction of using low candle-power lamps at frequent intervals which, while giving low illumination as compared to pre-war days, will improve the general lighting condition.

Glasgow, Scotland.—In Scottish towns generally the restricted lighting is being modified so as to allow of more lights in the streets. The whole question of street lighting in Glasgow has been under review in order to modify restrictions.

Paris, France.—In view of the possible shortage of gas for municipal lighting, the city council has agreed to experiment with kerosene to see what can be done with the humble oil *lamp à reservoir*. The Esplanade des Invalides is to be lighted by kerosene until further notice.

MOTOR TRUCK EFFICIENCY

Recommendation of Standard Method of Calculating on Basis of Cost Per Ton-Mile—Effect of Road Upon Efficiency.

In a paper before the American Road Builders' Association, R. E. Chamberlain advocated the use of standard terms for expressing the efficiency of motor trucks and the cost of motor truck service. The method of expressing such efficiency recommended was the cost per ton-mile. In order to compare such costs, it is necessary to standardize both the method of calculating total cost and the method of calculating ton-miles of service. "A committee of men experienced in the various phases of this problem are already working out a system to be known as the National Standard Cost System for Trucks. The present operating efficiency can never be greatly improved until cost figures of equipment operated under different conditions can be compared. We believe this will soon be possible."

The cost data available at present are very inaccurate and of wonderful variety. Truck costs should contain at least the items of interest on investment, depreciation or sinking-fund, insurance, taxes and licenses, drivers' wages, garage, fuel, lubricants, repairs and overhauls, and tires. Many, possibly the majority, of cost records of truck operation omit one or more of these items, some of them giving only drivers' wages and fuel. In order to make a comparison which shall be of any service, however, all of these items should be included.

In calculating the ton-miles of service, Mr. Chamberlain recommends that this be the product of the tons of load carried, times the distance over which it is carried. This allows nothing for distance covered with an empty truck. If a truck carried a succession of loads in one direction, returning empty each time, its ton-mileage would be only one-half as great as would be the case if it returned each time with a full load. Under such a condition, its efficiency would be said to be 50 per cent. The ton-mile capacity of a truck is the total distance covered by the truck in a day times the maximum load which it could have carried. The efficiency of the truck is the percentage which the ton-mileage of service actually performed is of the ton-mile capacity. Some recent traffic analyses have shown an operating efficiency of not above 37 per cent. If the ton-mile cost at 100 per cent efficiency would be 6.7c, a 37 per cent efficiency would give a ton-mile cost of approximately 18.1c. Conditions have been analysed where there was but 18 per cent efficiency, and the ton-mileage cost was 37.2c.

Mr. Chamberlain discussed the effect of road conditions upon truck efficiency, taking the resistance of a surfaced concrete road at 50 pounds per ton as the standard. Experiments made in California showed that a gravel road in good condition offered 82 pounds resistance and an earth road with dust offered 99 pounds. Assuming that a 3-ton truck is able to make 7.2 miles per hour on the standard road, its speed with the same load on gravel would be 4.8 miles per hour, and on earth, 3.6 miles per hour. If the truck runs 7 hours a day, the relative costs per ton-mile would be as follows: Surfaced concrete—16.3c; gravel—19.4c; earth—20.7c.

There are in use in the United States about 400,000 trucks of all capacities. Assuming them all to be of 3-ton capacity, that they work 300 days a year and average 30 miles a day, each of the trucks, if 30 per cent efficient, would produce 13,500 ton-miles a year; or a total for all the trucks of 5,400 million ton-miles. If we multiply this amount of ton-miles by the costs per ton-mile on the different surfaces, we find the costs of the three types to be respectively, $880,200,000, $1,047,600,000, and $1,117,800,000. There can be calculated, on the basis of these figures and the amount of trucking done on a gravel or earth road, what the theoretical saving would be in changing the surface of this road to one that offered less resistance.

EFFECT OF BOULEVARD ON PROPERTY VALUES.

Philadelphia has opened a boulevard from Broad street northeast for a distance of seven miles, no part of the cost of which either for land or for the improvement has been assessed against benefited property, although the selling values of adjacent property began increasing rapidly as soon as the project was definitely decided upon. Concerning this, Chester E. Albright, chief engineer of the Bureau of Surveys of Philadelphia, made the following statement in his annual report:

"The influence of the Boulevard as a creator of values has been directly felt over an area of more than 20 square miles. The assessed value of properties abutting upon and lying near it along its entire length has increased from 50 to 800 per cent, and actual selling values have increased in a far greater percentage, yet these properties contributed nothing toward the improvement, but received damages based upon new values created by it. It seems quite clear that a considerable part of this expense might have been assessed against benefited property in the vicinity, that the drain upon the public treasury might have been greatly reduced, and yet a very large margin of the profit allowed the land owners. As a matter of fact, the owners in the vicinity received all the benefits and the taxpayers in remoter sections of the city, who received little or no benefit, paid all the bills.

"Every city that has carried out improvements of this kind furnishes the same evidence of accrued benefits to property in the vicinity, and many of them have appropriated a part of the increased value to offset the cost through the medium of assessment for benefits.

"There is also abundant evidence that the creation of parks is a stimulus to increased land values and other benefits in their vicinity. It is an almost invariable rule that property in the immediate vicinity of a park is much more valuable than that further removed from it, and the same is true of parkways."

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POSSIBILITIES OF TRUCK TRANSPORTATION.

In a discussion at St. Louis, before the American Road Builders' Association, of the use of motor trucks for relieving railroad freight traffic, one of the members expressed his doubt of the possibility of substituting truck transportation at 6c a ton-mile for railroad transportation at less than 1c per ton-mile, especially since the latter figure includes interest and depreciation on the cost of the road-bed, while the former does not consider cost of building and maintaining the road over which the trucks travel.

This speaker apparently overlooked the fact that the truck transportation is to be used only for short hauls, probably less than 150 miles; also that the terminal charges are not included in the freight cost per ton-mile, or if so included form but a small part of the long-haul cost, whereas for short hauls they amount to much more than the cost of the railroad transportation. Moreover, the cost of handling at the terminals and delivering at package rate from terminal to destination is to be added to the railroad charges, whereas it is included in the cost of motor truck service. The comparison, therefore, should be made between motor truck service on the one hand and combined railroad service and terminal and delivery costs at both ends on the other. This was illustrated by the delivery of eggs from certain New Jersey communities to New York. By motor truck the eggs were handled but twice, or at most four times, while by train service they were handled as many as fourteen times in some cases. Each handling cost money and subjected the eggs and packages to possible damage. The delivery by motor trucks is daily, a round trip being made each day, while by train, the eggs are on their way two days.

While there may be some truth in the claim that thus far the cost of good roads and of maintaining them has not been included in the cost of motor truck transportation, it is not more than partially true. By the Illinois plan, the automobile fees are to pay the cost of building the main roads, and when they have been built will pay the cost of their maintenance. If, therefore, the proper charge is made for the motor truck licenses in estimating the cost of operation, the interest and sinking-fund charges to cover the cost of road construction are certainly included, and probably the major part of the annual maintenance cost.

Until the development of the motor truck reaches the state where the cost of the service is standardized, by standardizing designs, speeds, methods of collecting and delivering freight from purchaser to consumer or retailer, the benefit to the people along the roads will be great enough to off-set any question of value of the roads. For example, Mr. Neal of North Carolina said that the farmers in his county raised enough produce to feed all the people living in the country, but the roads are so bad that the products cannot be delivered at the local market centers when they are needed. As a consequence, food must be shipped to those centers from outside. There would seem to be no question that the farmers would gladly contribute the cost of good roads in return for a part of the benefit that they would derive from the new system. The consumer also would receive a part of the benefit in the form of a saving in long hauls of produce from outside the district as well as in the cost of the short hauls from the farm to the market center.

SETTLEMENT OF PIPE SEWERS.

In this issue will be found an article describing a method developed by theoretical considerations, checked and supplemented by practical investigations, for determining the pressures that come upon sewer pipes laid in trenches, and the ability of such pipes to withstand these pressures without cracking.

Aside from the value of the methods and coefficients presented therein, there are two features of sewer laying that are suggested thereby. One of these, which is referred to briefly in the report, is the fact that no amount of ramming of earth between the sides of the trench and sewer pipe laid therein will prevent such sewer pipe breaking by settlement of the arch due to the superimposed load, since the pipe will probably crack along the sides before its horizontal diameter has increased more than one-fiftieth of an inch, whereas the most solidly rammed backfilling cannot be relied upon to prevent a horizontal movement considerably greater than this under much less pressure than that developed by ordinary backfilling pressures. This does not mean, however, that there is no advantage in thoroughly ramming the backfilling at these points, since such ramming will ordinarily prevent the collapse of the sewer even though it may be cracked. The authors of the report state that there are probably many miles of sewers that are giving good service, although many of the pipes therein have cracked, but have not collapsed.

Another point suggested, but not referred to, is the probability of settlement of the sewer pipes under the load of the backfill and the effect of such settlement on the joints. Probably only a small percentage of the pipes laid in any sewer are bedded solidly on the original soil, but in the majority of cases the trench bottom has been cut from one-fourth of an inch to one inch lower than is necessary and the pipe is then raised above the natural soil by a layer of earth or (if the engineer and inspector are not sufficiently diligent in securing good work) by a

stone or stick placed under the bell-end of the pipe. Possibly the best construction practicable without the use of a concrete cradle would be to use sand or fine gravel for bedding the pipe.

We learn from the report referred to that when pipe is laid in accordance with good practice, a pressure is exerted on each lineal foot of pipe amounting to about 1,500 to 2,000 pounds for a trench having the average dimensions of two feet wide and eight feet deep. In the case of an 8-inch pipe, this pressure is supported by about two-thirds of a square foot under the best conditions of laying, and in many cases by as little as one-sixth to one-tenth of a square foot. That is, the load supported by the bed of the pipe will perhaps ordinarily range from 3,000 to 20,000 pounds per square foot. It seems almost certain that where the pipe is bedded in material other than the firmest of natural soils this pressure, due to the weight of the backfilling, will produce more or less settlement. This, unless the backfilling is a fairly clean, dry sand, will not take place at once, but may be delayed until a rain thoroughly saturates it. At any rate, it is almost certain that the full pressure will not be exerted upon the pipe until long after the cement joints have set. If all of the pipes settled uniformly there would be little danger to the joints; but it can hardly be supposed that uniform settlement will occur, since this would be possible only if the bedding under the pipes was uniform in both thickness and character of material throughout the sewer, and the pressure upon the pipes was uniform also. If the various pipes settled different amounts, the results could hardly fail to be a greater or less opening of the joints.

If we consider the reprehensible but too common practice of raising the sewer pipe by placing small stones or pieces of wood under one end, the condition is much more serious. If we assume a piece of stone or wood 3 inches square supporting one end of a two-foot length of pipe, we have approximately 2,000 pounds supported on an area of 9 square inches, or 32,000 pounds per square foot. Moreover, this pressure is exerted near the edge of the bellhole, where the soil is much more liable to yield than elsewhere. Under this condition there would seem to be no question that there would be a settlement of the bell unless it were supported by the spigot of the next pipe, in which case there would be a tendency for the top of the bell to be broken off, permitting the pipe to settle and producing a much more objectionable condition of joint than that previously referred to.

These considerations would seem to give additional force to the arguments for carefulness in grading the bottoms of sewer trenches and bedding pipes therein; also to suggest a further advantage of joints made of bituminous or similar flexible materials which would allow a slight movement of the pipes in settling without either causing leaky joints or breaking the bells of the pipes, unless the settlement of the bell-end considerably exceeded that of the contained spigot or vice versa. It also emphasizes the advantage of bedding sewer pipe in concrete saddles, thus distributing the load uniformly over a bottom of undisturbed natural soil.

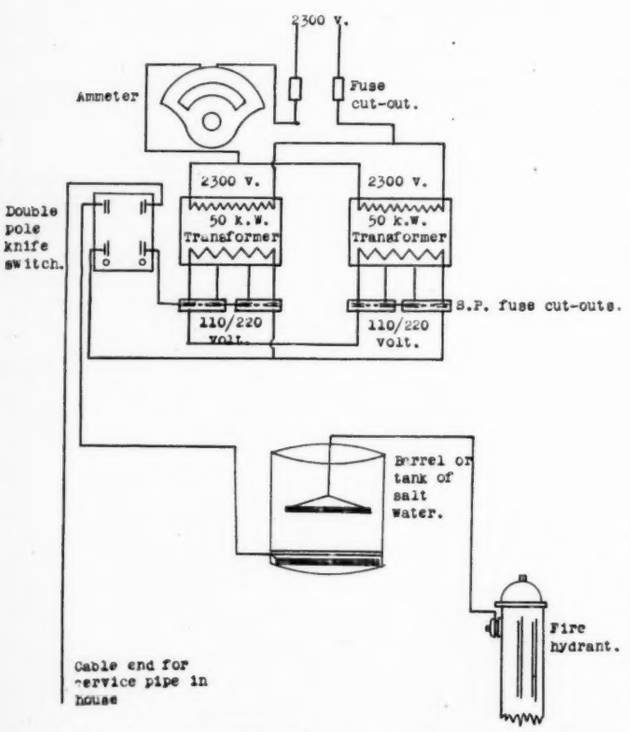


DIAGRAM OF ELECTRIC THAWING APPARATUS.

IN RECOGNITION OF OFFICIAL ECONOMY.

"In carrying out the provision of this resolve they may expend a sum not exceeding five thousand dollars."—General Court of Massachusetts, Resolves of 1917.

"No part of the appropriation under which this investigation was made has been expended." Henry P. Walcott, chairman, Metropolitan water and sewerage board; A. J. McLaughlin, commissioner of health, State Dep't. of Health; Edward F. Murphy, commissioner of public works of the city of Boston.

These two quotations from a report on the "Discharge of Sewage into Boston Harbor," dated January 9th, 1918, indicate a desire to economize in the expenditure of public money that is as commendable as it is rare.

THAWING FROZEN WATER MAINS

Method of Using Electricity at North Attleboro for Thawing Pipes Varying in Size from Small Service Pipes to Six-Inch Mains.

By WILLIAM PLATTNER.*

The Water Department of North Attleboro, Mass., like a majority of the water works departments in New England, has experienced the most severe winter known. The frost has penetrated to a depth from 3 ft. to 6½ ft., depending on the nature of the soil. During the past several weeks, starting Dec. 24th, 1917, several water service pipes one-half inch, three-quarter inch, one inch, and two inches diameter have frozen, and late in January, 1918, 6-inch cast-iron water mains froze. The water department had a similar experience in 1912, when the frost penetrated to a greater depth than had been known up to that time; but in 1912 no 6-inch pipe was found frozen.

In 1912 the writer made up an electric thawing apparatus, consisting of a 20 kilowatt transformer, 2,300-volt primary and 110 and 220-volt secondary, this being an ordinary lighting transformer. This worked very satistorily for all pipe up to 2-inch, and has been in use each winter since then.

During the past winter the frost reached not only to the service pipes supplying residences, stores and factories, but to 6-inch cast iron water mains and 6-inch branch pipes leading to fire hydrants. In the majority of cases where water could not be gotten through the hydrant, it was found that the branch pipe leading from the main to the hydrant was frozen, but the main itself was clear because the circulation of water through it kept it from freezing.

*Manager of Electric Light and Water Departments, North Attleboro, Mass.

The Water Department, under the supervision of the writer, was equipped during the past winter to thaw out any size pipe up to 8-inch, including 7-inch barrel hydrants, and the apparatus has worked out satisfactorily.

The illustration shows a 3-ton Velie truck with the following equipment: Two 50 kilowatt General Electric Co. lighting transformers, 2,200 volt primary and 110 and 220-volt secondary; an ammeter, General Electric Co. make, 0 to 100-ampere reading, located at the top of transformer and connected on the 2,200-volt side of the circuit. On the front of the transformer, where the secondary or low-voltage cables are located, there are mounted four single-pole, 600-ampere fuse blocks, used for changing voltage from 110 to 220 or vice versa, and the 110 and 220-volt wires are connected to these blocks. Instead of fuses, heavy copper bus bar blades are used. The changing of the bars to get the desired voltage is made while the current is shut off.

A large double-pole, single-throw knife switch is mounted at the top of the left transformer, as shown in the illustration, which disconnects all low voltage electricity to cable running into the house and fire hydrant. 2,200-volt electricity is carried to the transformers on the truck and connected to General Electric Co. primary cutouts, which are located on the opposite side of the truck, as shown in the view. No fuses are employed in any part of the equipment. Current to the extent of 100 amperes on the 2,200-volt side has been drawn through the transformers.

One low-voltage cable is connected (see diagram) to a cast iron flange which is located in the bottom of an oil barrel, the barrel being half filled with water containing 4 lbs. of common table salt. The top cable coming out of the barrel is used to regulate the flow of current. On this cable is bolted another cast iron flange 16 inches diameter and 1-inch thick, which is lowered or raised by the hand of the man operating it and who at the same time observes the ammeter on the transformer which indicates the amount of electricity in amperes flowing. If he is thawing with 110-volt electricity, he simply multiplies the ammeter reading by 20 (the ratio of transformer being 2,200 to 110 volts) which give him approximately the current on the secondary side of the circuit; and if the 220 volt is used, he multiplies by 10. By keeping the ratio of transformation in mind, he can readily at a glance determine the flow of current he is using.

The 110-volt electricity is used on short services and the 220-volt on long services.

The two reels on top of the truck shown in the illustration contain 1,500 ft. of twin flexible insulated stranded cable. When customers with frozen services are beyond reach of the 2,200-volt primary circuits of the town's lighting system, then the twin conductor cable is laid on the ground to the truck.

The three bottom reels contain 1,200 ft. of No. 00 stranded weatherproof cable. This end of the cable is carried into the house and wound around the pipe, to make a good connection with the pipe to be thawed. The other end of the cable is connected to a short cable coming from the double-pole switch. Two bolt guy clamps were used in connecting the cable together.

The end of the cable coming out of the barrel is fastened under the cap of a fire hydrant, thereby completing the circuit through the water main and the house service pipe. (See diagram).

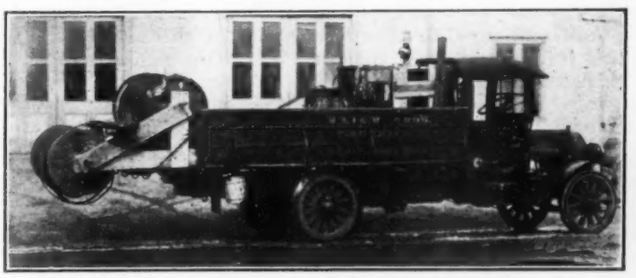
After the electricity is brought to the transformer in the truck, the main switch is thrown in. Then the top cable with the cast iron flange is lowered into the barrel containing the water; the further this is lowered into the barrel (thereby bringing the upper plate near the lower plate) the greater will be the flow of current.

Great care must be taken to allow for the kind of pipe to be thawed. An old, plain iron or galvanized pipe can not withstand as much current as a new pipe of a similar size, on account of the deteriorated condition of the threaded joints, unions and couplings, etc., which might burn the pipe off due to unusually high resistance.

Lead service pipes of ¾-inch diameter require approximately 300 to 500 amperes of current, while plain iron or galvanized or cement-lined iron requires from 150 to 400 amperes, depending upon the size and condition. The time required to thaw such pipe is about 5 to 15 minutes and in some cases 20 minutes. Six-inch cast-iron water mains require 500 to 800 amperes and in some instances 900 amperes. Six-inch and 7-inch barrel fire hydrants, which is the ordinary 2-way or 3-way 2½-inch nozzle type, require from 500 to 900 amperes.

In one instance it took only 15 minutes to thaw a 6-inch cast iron water main, current flowing through the pipe 800 amperes at 110 volts. In another instance it required 1 hour and 10 minutes with a current of 500 amperes and at times raised to 600 amperes at 220 volts; and another 6-inch main required 3 hours and 45 minutes with a current of 500 to 600 amperes at 220 volts. The difference in the time required was undoubtedly due to the fact that some of the mains were frozen a greater distance than others.

We also thawed 300 feet of 3-inch wrought iron steam pipe line running between two factories in 15 minutes at 450 amperes at 110 volts. In another case we thawed a 5-inch cast-iron sewer pipe running between two buildings, the time required being 45 minutes with a current of 540 amperes at 110 volts; the cable being connected or twisted around the iron pipe in one of the buildings and the other end of the cable on the sewer pipe in the other building.



TRUCK CONTAINING THAWING APPARATUS.

Our crew consists of 9 men as follows: 2 on truck operating main switch and cable in the barrel; 1 lineman who connects all wires to the 2,200-volt lines; 1 hydrant man, who sees that the cable is properly secured under the cap on the nozzle and sees that a good contact is made; 2 men in the cellar to connect cable on the pipe to be thawed and also inspect all piping as to joints or whether the water pipes are resting on gas pipes or come in contact with any other underground structure; 3 men to pull cable and guard same when laid in the streets and also to guard the high-tension, 2,200-volt cable. With the above outfit we have thawed as many as 32 services in one day, and in each instance thawed out an average of three consumers to a "hitch." The frozen service pipes were not confined to any particular locality in the town, but pipe was found frozen in remote sections of the town as well as in the congested district. More services were found frozen in coarse gravel and ledge and rocky soil, where the frost penetrated to a depth of 6½ feet, than in hard pan and clay soil, where the frost penetrated only to a depth of 3 to 4 feet. The average cost, including depreciation on cable (which runs high in such cases) and all other charges, was approximately $8.00 per service.

The WEEK'S NEWS

State Highway Developments in Idaho, Texas and Oregon—Repairing New York's Streets—U. S. Public Health Service's Anti-Malaria Operations—Typhoid Reduction in Ohio—Power Rates Increased in Philadelphia—President Wilson and Secretary McAdoo Discuss Public Utility Conditions—Firemen and Police Get Higher Pay in Two Cities—Dayton's New City Manager—Equalization of County Taxes in New York State.

ROADS AND PAVEMENTS

Only "Necessary" Roads in Idaho.

Boise, Idaho.—Engineers from the forest service and from the United States Office of Public Roads have been in conference with members of the state highway commission on highway work being done in Idaho. It was agreed that the forest service would co-operate with the state in building only such roads as are necessary for use in transporting war materials and foods in 1918. Work will be carried forward on the Sawtooth park highway, which leads over Galena summit into the Custer basin country in south Idaho; on the Fourth of July canyon, in Kootenai county, and on a stretch of highway which connects Kooskia and Lowell in Idaho county. It was agreed that nothing would be done this season on the Yellowstone park highway by the forest service, since the road is not valuable for military purposes. Some valuable mines are located in the Salmon river country, north of the Sawtooth range, and since metals taken from them must be hauled overland to Ketchum, the closest railroad point, it was agreed that there is an immediate demand for a minimum grade over Galena summit. The two other roads also reach important mining properties. Idaho's forest service appropriation for the year beginning July 1, 1918, is $104,700.

State Highway Commission Held Constitutional.

Austin, Tex.—The constitutionality of the law creating the state highway commission has been upheld by the third court of civil appeals in the case of P. S. Adkins against Curtis Hancock, chairman, et al., from Travis county. The case was heard by a special court. The contention of Adkins was that the law was a tax and could not be collected through the medium of a commission. It was insisted by the commission that it was a license fee and could be collected under the police powers of the state.

War-Time Road Program of Oregon.

Salem, Ore.—War conditions will directly affect the road building policy of the state highway commission in 1918. The program for active work has been materially changed for the present year by the commissioners along two main lines: Road work to be confined almost exclusively to the trunk lines of the state; practically no paving save what can be laid by the state's own paving plant. A great increase in motor truck traffic is looked for because of railroad conditions. The trans-state roads are to be used as main arteries. With the state pushing through these main roads the feeders will be taken care of by the respective counties. Many counties and road districts have substantial sums of money for road work and this money will be devoted to placing in shape the lateral roads leading to or connecting with the trunk lines. The main roads will connect the principal markets of the state and motor trucks can move from town to town with freight. The greatest amount of mileage for the money available is the intention of the commission. Increased mileage can be obtained by the use of macadam and gravel, preference being given to one or the other of these materials, depending on availability of supply, with regard to location of the work being performed. In this connection the commission takes into consideration that the courts have held that a "hard surface" pavement is not necessarily the smooth, finished surface, but includes macadam and similar material. There are a number of paving contracts which were let last autumn and which have not been completed. These will be carried on as the contracts provide, but aside from these no new paving projects are contemplated other than such paving work as can be handled by the state's own plant. This state plant will probably be located in the Willamette valley, on the Pacific highway, possibly somewhere in Marion county, between Salem and Canby. By June, unless something unforeseen occurs, the main obstacles on the Columbia River highway, between Hood River and Astoria, will have been eliminated. These are heavy grading jobs, the principal ones being in the Cascade mountains, where it is all rock work. Beyond The Dalles a gravel road will extend into Umatilla county by the end of the year, and it is possible that that time will also see the connecting link between Hood river and The Dalles available for traffic. Thus before 1918 is over the east and west main artery across Oregon will be open. Contracts for the big grading jobs on the Pacific highway, between the California line and Portland, have been let, and should be completed during the summer. These take care of the worst spots and will open the north and south artery to traffic. Many counties which were expecting assistance from the state in 1918 will be compelled to wait. The main roads must be pushed to completion first and then such other main roads as are necessary to connect up important parts of the state.

Lincoln Highway Improvement in Indiana.

Indianapolis, Ind.—The state highway commission has appropriated $73,500 for the improvement of the Lincoln Highway in Allen county following the appeal of the Section on Co-operation with States of the Council of National Defense. Members of the state highway commission have been in Fort Wayne recently completing details in connection with the work of construction which is to be started early in the spring. Conferences have been held with county authorities and plans and specifications for the work to be undertaken are being filed. The work to be undertaken will cover all of the unimproved sections of the Lincoln Highway in the county outside the corporate limits of the towns and villages. It is anticipated that the work in question will result in the permanent improvement of the Lincoln Highway from the Ohio state line on the east to the Noble county line on the west. It is the plan of the state highway commission to further its improvements upon the main through connected roads of the state, favoring those interstate in character. In the carrying out of this plan the Lincoln Highway has been termed a "main market road," and in consequence will be one of the first to receive state aid, as the improvements in Allen county indicate.

Repaving in New York City.

New York, N. Y.—Frank L. Dowling, president of Manhattan borough, recently made the announcement that he was preparing to spend $2,800,000 repaving Manhattan streets. Business interests have been urging for months that the marginal thoroughfares on the east and west sides in front of the piers be improved at once. In many places there are so many ruts that trucks have been seriously damaged delivering goods. "These marginal ways present a peculiar condition," said Mr. Dowling, "because the dock department has charge of half of the street next to the docks and the other part is in charge of the borough president. The paving should be under one control, and I

have asked the corporation counsel for an opinion regarding the borough president taking entire charge of repaving those streets. If he holds that the borough president has not the legal right to do all the paving, it will be necessary to go to the legislature and have this detrimental division of street paving authority along the river front removed. We could easily use $5,000,000 for repaving the streets of Manhattan," added Mr. Dowling, "but the Board of Estimate is not inclined to spend much money, and we will have to get along with about half that amount. Motor trucks are getting heavier all the time and destruction to pavement is greater than a few years ago. The result will be that we will have to get an entirely new type of pavement or limit the weight of vehicles. I should like to have suggestions from the motor truck men as to some wheel or tire width that would not cut pavement."

SEWERAGE AND SANITATION

Anti-Malaria Work of U. S. Public Health Service.

Washington, D. C.—Secretary McAdoo announces that the United States Public Health Service of the Treasury Department has practically completed plans for preventing malaria among soldiers at camps and cantonments during the coming spring and summer. In a zone from one to two miles wide around twenty or more camps in the South every known effective method of eradicating the disease will be employed under the supervision of experts. In the camps themselves the Army authorities will control the disease. In the past the Public Health Service has supervised demonstrations which have proved beyond question that its methods are effective. They are similar to those which made possible the building of the Panama Canal after eradicating the yellow-fever mosquito. Measures against the disease are designed either to eradicate the Anopheles variety of mosquito or to prevent persons from infecting them or being infected by them. As other varieties of mosquitoes will incidentally be eradicated, not only will malaria be prevented, but the mosquito as a pest will be driven from the vicinity of the camps. At each camp where there is danger of malaria an expert, probably a sanitary engineer, will be in charge of the malaria operations. He will be supervised by Public Health Service experts who know malaria prevention to the ground. The plans contemplate a survey of the area around the camps. The proper zone for malaria work, the amount of malaria occurring in the previous year, the breeding and hiding places of malaria mosquitoes, and the best methods of prevention in the particular zone will be determined.

Court Upholds Right to Require Vaccination.

San Antonio, Tex.—The right of the board of education to require vaccination as a pre-requisite for admission to the San Antonio public schools was sustained by the fourth court of civil appeals in an opinion given in the case brought by five residents of San Antonio against the board of education. They protested at the action of the school board, which issued a ruling that no child would be admitted to the public schools unless the city health ordinance had been complied with. A provision of the city health ordinance stipulated that no child should be admitted to the public schools who was not able to show a certificate from some registered physician that such child had been vaccinated against smallpox within the last preceding six years. In their petition the appellees held that vaccination is loathsome, terrible and dangerous, as well as likely to permanently impair the health of the patient or cause the loss of the member of the body vaccinated, or the death of the individual. In the opinion of the fourth court of civil appeals the state law, passed by the thirty-fifth legislature, creating the San Antonio independent school district, gave that body the management and control over such schools, and points out that the board thus created has the power to set up the qualifications for admission. The point made by appellees that their children are denied equal rights under the law is denied. It is held that this power for the control of the schools is conferred on the board, not on the parents, no matter how correct their conscience, convictions, faith or religious beliefs may be. Reference is made to another case, previously decided in the supreme court of the state, and which was appealed from here, in which the right of a former board to require vaccination of pupils before they would be admitted to the schools was sustained. It is held, under that decision, that the present regulation is a reasonable one and that the opinion of the lower court should be maintained.

Water Purification Reduces Typhoid in Ohio.

Columbus, O.—How cities can reduce their typhoid death rates by purifying their water supplies is demonstrated in typhoid statistics for a group of seven Ohio cities given out by the state department of health. These cities are Alliance, Ashtabula, Bellaire, Cincinnati, Columbus, Portsmouth and Steubenville. All have improved their water supplies in the last ten years and all have shown immediate drops in their typhoid death rates shortly after such improvements have been made. Cincinnati and Columbus, both of which put improved water systems into operation in 1908, offer the most striking evidence of the value of purification plants. Before 1908 Cincinnati's deaths from typhoid fever were averaging just under sixty per 100,000 population each year. Since 1908 the average rate has been 8.1 per 100,000, representing a decrease of 86 per cent. Columbus, before her plant began operations, was losing on the average 77 persons per 100,000 population each year to typhoid fever. In one year, 1914, the Capital City had the high rate of 147.7 per 100,000. With pure water the rate has fallen to a yearly average of just over sixteen. In Alliance water purification, installed in 1913, has brought the average yearly typhoid mortality rate from 33 to 20. In Ashtabula a change in 1909 has lowered the figure from 68 to 25. In Bellaire, Portsmouth and Steubenville, where purification began in 1915, the drops have been, respectively, 37 to 13, 86 to 33 and 70 to 33. The fact that the rates in several of these cities, despite the heavy decreases noted, still remain high by comparison with Cincinnati indicates, according to the health department, that water purification does not "tell the whole story" in typhoid prevention. Wells and insanitary privies are designated as causing much typhoid fever, even though the city water supply is pure. Toledo is cited as a city in which other causes have prevented water purification from making much change in the death rate. The typhoid death rate for the state at large has declined steadily in recent years, falling from 27 in 1910 to 15 in 1916.

WATER SUPPLY

State Health Department Has Emergency Chlorinator.

Columbus, O.—The division of sanitary engineering of the state department of health now possesses an emergency apparatus for the chlorination of water, which will be available for use by any city of the state when need suddenly arises for temporary disinfection of water. The chlorinator was used for several weeks recently in Hamilton, where the calling into use of an emergency water supply made disinfection necessary. The Hamilton city authorities in this case supplied the materials.

Water Companies Lose in Diversion Suits.

Paterson, N. J.—Finding that the answer of East Jersey, Montclair and Acquackanonk Water companies, as a whole, does not constitute a valid defense to the suit brought by the Weidmann Silk Dyeing Company of Paterson to enjoin the further diversion of water from the Passaic River or its tributaries, Chancellor Walker has filed an opinion striking out the answer. Chancellor Walker held that, since the Weidmann company is entitled to an injunction upon equitable terms, these terms may be settled upon motion instead of requiring the complaining company to go to a final hearing. The opinion pointed out that as shown by the petition of the Weidmann company the only issue in the case would follow refusal of the defendant corporations to make compensation for the diversion. As the answer of the defendants contained an offer to make compensation, if the rights of the Weidmann company should be established,

the court held that this having been done it has power by virtue of the consent to fix the compensation. Discussing further the equities of the case, Chancellor Walker said:

"If an upper riparian owner diverts water from a lower one for the purpose of supplying water companies or municipalities which have the ultimate power of condemning the water rights in question, they would be allowed to do so upon compensation being made in aid of the upper owner's diversion for public use, exercising their own rights of condemnation in connection with contracts with the diverting riparian owner.

"There is no estoppel against a lower riparian owner's protection of its right, as such, by mere silence or failure to give notice, or bring suit. This legal right of the riparian owner is barred only by a grant or by uninterrupted enjoyment by an upper owner for the full prescribed period of twenty years.

"A lower riparian owner who with others pollutes a stream from which an upper riparian owner diverts the water, is not thereby estopped from having appropriate injunctive relief upon the principle that it does not come into court with clean hands because the maxim is confined to this conduct, however gross, with which the opposite party has no concern."

STREET LIGHTING AND POWER

Electric Rates Increased.

Philadelphia, Pa.—The rates of the Philadelphia Electric Company for manufacturing purposes and lighting of business places are to be increased 10 per cent under the terms of an order by the public service commission. The company asked for a 20 per cent increase, which, however, would not affect residential lighting rates or the contracts the city has for the illumination of the park system and streets. William Draper Lewis, who opposed the application of the company, said war conditions made an increase in rates necessary; but he argued the increase should be kept down to 7 per cent. Similar orders were issued to the Bala and Merion Electric Company and the Delaware County Electric Company, which also had asked for 20 per cent increases. The commission said:

"Under the provisions of the public service commission, rates which have been determined by the commission cannot be changed by the company within a period of three years after the action of the commission unless application is made to the commission for permission to make such change.

"From the testimony it appeared that the operating expenses of the companies had been increased to an unusual extent by the abnormal prices they were required to pay for labor, materials and coal, and that the great industrial development in Philadelphia and surrounding territory has forced the companies to expend large sums of money in an endeavor to meet the requirements of the district for electric power.

"The companies asked the commission to permit them to increase by 20 per cent their charges to all classes of consumers except domestic consumers, who admitted that the company was entitled to an increase in its rates for power, but contended that the amount asked for was excessive. After considering the testimony the commission made an order refusing to grant its approval to the 20 per cent increase, but authorizing the companies to file new tariffs effective on one day's notice increasing by 10 per cent their charges to all except the small consumers and the municipalities, whose rates are to remain as heretofore.

"The commission refused to make this increased schedule effective during the duration of the war, and stipulated that it should become void at the end of a year, unless the companies furnished the commission with detailed statements of the result of their operations and secured a further authorization from the commission."

President Wilson and Secretary McAdoo on Public Utilities.

Washington, D. C.—Secretary of the Treasury William G. McAdoo has made public a letter to President Wilson regarding the condition of the public utilities of the country. He says:

"I beg to hand you herewith several memoranda and letters relating to street railway and other local public utilities furnishing light, heat, and power, which I have been asked to bring to your attention by a committee representing public utility interests.

"These papers indicate the existence of genuine apprehension regarding the adequacy under present conditions of the services and rates of local public utilities. The view is expressed that increased wages and the high cost of essential materials and supplies have affected them as they have affected everybody else, and that united effort will be necessary in order to meet alike the public requirements for service and the corporate financial needs upon which that service depends.

"As Secretary of the Treasury I must take official notice of these matters. It is obvious that every part of our industrial and economic life should be maintained at its maximum strength in order that each may contribute in the fullest measure to the vigorous prosecution of the war. Our local public utilities must not be permitted to become weakened. The transportation of workers to and from our vital industries and the health and comfort of our citizens in their homes are dependent upon them, and the necessary power to drive many of our war industries and many other industries essential to the war is produced by them. It may be that here and there, because of the prominence given to less important interests immediately at hand, State and local authorities do not always appreciate the close connection between the soundness and efficiency of these local utilities and the national strength and vigor, and do not resort with sufficient promptness to the call for remedial measures. In such cases I am confident that all such State and local authorities will respond promptly to the national needs when the matter is fairly and properly brought before them.

"Our public service utilities are closely connected with and are an essential part of our preparations for and successful prosecution of the war, and the unfavorable tendencies which the accompanying papers reveal may most effectively be checked, wherever they may be found to exist, and the needed relief obtained, only by prompt action on the part of the respective local authorities.

"I earnestly hope that you may feel justified in expressing the conviction that the vital part which the public utilities companies represent in the life and war-making energy of the Nation ought to receive fair and just recognition by State and local authorities."

President Wilson's reply was as follows:

"I have examined with care the memoranda and letter which you transmitted to me with your letter. I fully share the view you express regarding the importance of the public service utilities as a part of our national equipment, especially in war time. It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view. I hope that State and local authorities, where they have not already done so, will, when the facts are properly laid before them, respond promptly to the necessities of the situation.

"I shall be glad to have you communicate with the local authorities whenever the information in your possession suggests that such a course is desirable and in the national interest."

Commission Rules on Conservation in Utility Financing.

San Francisco, Cal.—Establishing the policy that public utilities should postpone all extension work not clearly necessary while "the costs of materials and money are abnormally high," the state railroad commission has permitted the Pacific Gas and Electric Company to use $771,348 from bond sales to pay for capital expenditures in the recent past, but considers the proposed bond issue of $3,000,000 for development and expansion unwise on account of the money market. It was to reimburse its treasury for expenditures up to August 31, last, and to finance in part the large improvements referred to, that the company asked the commission for authority for the $3,000,000 issue at not less than 85 per cent of face value. This $3,000,000 issue, being now considered unwise on account of the money market, the company itself so stating, the decision says that it is not necessary to approve the company's construction programme in all its details, but that the new gas works at Fresno seem advisable, as also the enlargement of the Potrero gas plant, and the utilization of existing interconnection facilities between the Northern California hydro-electric utilities, by hooking up the Wise tower line with the line of the Sierra and San Francisco Power Company at Manteca, and thence using the Sierra's line from Manteca to Mission San Jose. Referring to the influence of war conditions on the proposed financing of the Pacific Gas and Electric Company, the decision of the Railroad Commission says:

"It is a matter of common knowledge that many public utilities as well as other enterprises will have considerable difficulty in financing new construction during the war. The general welfare requires that our electric utilities, which play so vital a part in the Nation's efficiency, shall, in so far as possible, conserve their financial strength so that they may continue to be able to secure such funds as are imperatively needed to increase their production and maintain their efficiency. Expenditures which otherwise might be considered desirable, even though not immediately necessary, should be deferred in favor of expenditures most urgently necessary at the moment to increase the efficiency of these utilities to help win the war."

Expert Reports on Street Lighting Contract.

Newark, N. J.—The Public Lighting Service Corporation, which furnishes and maintains gas lamps for street lighting, is not living up to the terms of its contract, according to a report submitted to director Raymond of streets and public improvements by Willard D. Hine, a gas engineer of New York, retained to make an investigation. It is not unlikely that Mr. Raymond will endeavor to terminate the contract. The company's bills for the last few months have been referred to the law department to furnish a basis of settlement. Laboratory tests of the lamps made by Mr. Hine, the report states, showed that they did not give fifty candle-power when burning 3.3 cubic feet of gas an

hour. Conditions in the laboratory were more favorable to the lamps than they would be on the street, so that Mr. Hine concluded the candle-power of lamps on the street would be considerably lower. The contract provides that lamps of fifty candle-power must be furnished. Other respects in which Mr. Hine says the lamp company has fallen down are: "Many lamps are not marked with the street number; many lamps are not lighted, although the gas was available; the lamps and fixtures are not maintained in a workmanlike and substantial manner." Of sixty-nine gas lamps he inspected January 4 he found fifteen were out; fifteen gave poor light; seven gave fair light; twenty-nine gave good light, and three very good light. The recommendations made in the report are:

"The entire co-operation of the Police Department should be secured in connection with the daily reporting of all gas lamp outages.

"All outages observed should be officially reported the same day both to the Public Lighting Service Corporation and to the Public Service Gas Company.

"The Public Lighting Service Corporation should report to the City Lighting Department daily all outages because of no gas and this report should be forwarded immediately to the gas company.

"The gas company should be required to take immediate steps to open all services and risers where reported to them as without gas.

"The Public Lighting Service Corporation should be required to comply fully with all the terms of its contract with the city."

FIRE AND POLICE

New Rates of Pay for Firemen and Police.

Ogden, Utah.—Over the protest of the mayor, who urged that the fire chief and police chief be given equal salaries, the council passed an ordinance fixing the rates of pay in the two departments. These will be: Fire department: Chief, $165; assistant chief, $125; captain, $115; machinist, $110; inspector, $100. Each fireman other than those enumerated will receive $85 per month the first year, $95 the second year and $105 per month thereafter. Police department: Chief, $175; captain of detectives, $120; sergeant, $110; detectives, $100; eleven patrolmen, first year, $90; second year, $100; desk sergeant and property clerk, $95; two desk sergeants, $85; chauffeurs, first year, $90; second year, $100; guard, janitor and weight master, $70; merchants' patrol, $35.

Dubuque, Ia.—Following a request of the firemen for a twenty per cent. raise in wages, council voted to give the firemen a flat raise of ten dollars per month clear through the department and to make the wages of the policemen the same as the firemen. The wages of police and fire departments will now be as follows: Chief—$135 per month. (Formerly $130 for police and $125 for fire.) Captains (also detectives in the police force)—$95.00 per month. (Formerly $85.00.) Engineers in fire department—$97.50 per month. (Formerly $87.50.) Desk sergeant (in police department)—$100 per month. (Formerly $100.00.) First year men (both departments)—$75.00 per month. (Formerly $65.00 for fire and $70.00 for police.) Second year men (both departments)—$80.00 per month. (Formerly $70.00 for fire, $75.00 for police.) Third year men (both departments)—$85.00 per month. (Formerly $75.00 for fire, $75.00 for police. After three years (both departments)—$90.00 per month. (Formerly $80.00 for fire, $75.00 for police.) City electrician—$110.00 per month. (Formerly $100.00.)

Police Chief Loses in Suit Over Discharge.

San Antonio, Tex.—The verdict returned in favor of Frank Newnam, former chief of police, together with a judgment of $1,927.86 against the city, growing out of his discharge upon the election of the late mayor Jones, has been reversed and remanded by the court of civil appeals. This case was brought in the Forty-fifth district court and judgment submitted there on special issues. One of these set forth that Newnam was discharged by mayor Jones for political reasons and that this was contrary to the expressed provision in the charter. In the opinion the charter provision is quoted. This gives the power to the mayor to discharge an employe whom he feels is "incompetent or unfit," but stipulates such employe must not be discharged for political reasons. It is pointed out by justice Swearingen that there is nothing to show that mayor Jones did not feel that Mr. Newnam was "incompetent and unfit" to be at the head of the police department and the fact that the first plank in mayor Jones' platform was that he would "fire Frank Newnam" did not alter the situation. The court held that the belief that Newnam was unfitted for this office may have actuated mayor Jones to have placed this in his platform. The fact that W. L. Richter, John Kinney and P. G. Lucas, aldermen at the time, testified that they believed Mr. Newnam competent and fit, the court holds, does not prove that he was so considered by mayor Jones and that is the one point at issue. The political reason, the court holds, may have been founded on the opinion and, if so, the mayor would not have been barred from discharging the officer. The discharge of former chief of police Newnam followed the bitter political fight of 1912, when Jones was elected to fill out the unexpired term due to the death of mayor Callaghan. The first act of mayor Jones, when he took office was to announce the discharge of Newnam. The suit subsequently brought by Newnam was for salary, which he claimed was due him as chief of police from August 19, 1912, until June 1, 1913.

Big Loss in Chocolate Factory Fire.

Hershey, Pa.—Fire which broke out on the top floor of one of the buildings of the Hershey Chocolate Company's plant caused a loss estimated at several hundred thousand dollars. The room in which the blaze occurred is about 200 feet long by 60 feet deep and more than 1,000,000 pounds of chocolate in powdered form, one of the advanced stages of manufacture, was stored there. The building was of fireproof construction, and while the blaze was confined to the fourth floor, where it originated, stock in other rooms was damaged by water. Local companies fought the blaze, sending out calls for aid to neighboring towns. The fire was under control when Lebanon companies responded and helped to extinguish it. A watchman saw no evidence of fire when he made his rounds shortly before the flames were discovered. While no definite cause of the blaze has been found, it is thought to have been the result of spontaneous combustion.

GOVERNMENT AND FINANCE

Barlow Succeeds Waite as Dayton Manager.

Dayton, O.—Service director J. E. Barlow has been named city manager to succeed Henry M. Waite, who is on leave of absence in army service. Manager Barlow will receive $7,500 a year instead of the $12,000 Mr. Waite received because "the job grows easier." "City manager Waite came to this city just after the flood of 1913," said commissioner Flotron. "Our finances and physical property were then in a chaotic condition. Extra effort was required then to work out and establish the policies and an organization for the new government. Today the form of government is a going concern." The appointment conforms with the recommendation of Mr. Waite and with the theory of promotion by which the post of director of public service was considered next to that of the manager. Mr. Barlow was born in Summerville, Mass., about forty-five years ago. He took a college preparatory course at Phillips Academy, Andover, Mass. He then entered the Boston Institute of Technology, where he obtained his B. S. degree. He then became instructor in the college from which he matriculated. A little later he was engaged in United States geological survey work and still later had an important post on the construction of the Charles river dam. Then Barlow was taken over by the Metropolitan water and sewerage board of Boston and afterwards by the board of water supply of New York on the Catskill project. While in New York, Mr. Barlow was an instructor in the Brooklyn Polytechnic institute. He then went to Cincinnati as an expert engineer with the bureau of municipal research and

subsequently was made principal assistant to the chief engineer of the city by Henry M. Waite. When Waite was called here as city manager, he brought Barlow with him. Another man whom Waite brought with him was Harry P. Martin, who has been employed here as street commissioner. He had been employed in the same capacity in Cincinnati. Martin, it is believed, will be appointed by city manager Barlow as his own successor in the position of service director. To this position there attaches an annual salary of $4,000. Among the reasons given by commissioner Flotpon for the appointment of Mr. Barlow were: "In the state of Ohio or any other place, for that matter, there is no man available for city manager who has a more comprehensive grasp of this situation than Mr. Barlow. He is, himself, an engineer, of far more than ordinary ability and can work into the breach with splendid effect (referring to the conservancy project). We have in course of construction many sewers, extension of water mains, bridges, etc., with which Mr. Barlow, alone, is familiar and consequently the most logical man to be placed in charge to carry out this program. Mr. Barlow, I have found, has always been conservative and safe on every problem. He has never been antagonistic to labor or unfairly friendly to capital. The taxpayers of Dayton have paid for his education so far as the application of his ability to our needs are concerned, and it would be a foolish policy to destroy that investment and take a chance of bringing some new, untried, inexperienced man who might in the end prove a failure, and this is no time for experiment."

City manager Waite, who has a month's leave of absence, is now lieutenant-colonel of the transportation corps, engineering department. If at the end of the month he is still in the army he will resign his $12,500 position to continue in the new one, which pays $3,500. Many months ago Mr. Waite offered his services to the government in any capacity.

City Entitled to Franchise Guarantee.

Portsmouth, Va.—"We are of the opinion that the city of Portsmouth is entitled to the fund in controversy in any aspect of the case," ruled the Virginia Supreme Court of Appeals in an opinion reversing the Portsmouth court in the case in which the Portsmouth and Norfolk Corporation endeavored to recover the amount of a $5,000 certified check which it put up in 1910 as a guarantee of its good faith when it bid for the franchise for lighting the streets of the city. Although awarded the contract, the company, because unable to finance the undertaking, declined to execute it and the $5,000 was forfeited. Five years later it sought to get back the money, contending that the requirement of a deposit as a prerequisite to bidding for a public franchise is contrary to the constitution of Virginia. "This proposition," said the appellate tribunal, "is based upon a misapprehension of facts."

Charges Against East St. Louis Mayor Dismissed.

East St. Louis, Ill.—The indictment against mayor Mollman of East St. Louis, arising out of the race riots there last July, has been dismissed in the circuit court.

Urges Just Equalizations.

Albany, N. Y.—In a letter to the mayors of the state, the tax committee of the New York State Conference of Mayors and Other City Officials urges each city to make an investigation of the equalization of assessments and apportionment of general taxes by board of supervisors or the equalization commission of its county. If it be determined after examination that serious injustice has been done by such equalization and apportionment, the city is urged to appeal to the state tax commission for relief. "Examination of equalization by boards of supervisors, generally, leads to no other conclusion," the letter says, "than that by far the greater number of equalizations are not based upon facts—rather upon favoritism and politics." To prove this the committee cites the experiences of four cities. Saratoga Springs appealed to the state tax commission from the equalization of assessments by the supervisors of Saratoga county and as a result had refunded to it about $30,000. North Tonawanda and Lockport have recovered $10,000 each in a similar way. Buffalo has received about $80,000 from the other tax districts in the county on account of taxes incorrectly apportioned by the board of supervisors. Appeals from county equalizations now pending before the state tax commission are from Lackawanna, Saratoga, Schenectady, Troy and New Rochelle.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Municipal Electric Plant—Liability of City.

(Okla.) City operating electric plant for sale of electricity, etc., was subject to same liability to its employees as that assumed by private persons or corporations, and was bound to exercise correspondingly high degree of care, with regard to probable contingencies.—City of Durant v. Allen, 168 P. 205.

Worthless Pavement—Assessment—Recovery.

(Wis.) Where worthlessness of street pavement was due to city's negligence held that property owners, assessed for the original pavement and for its resurfacing, had a right of action for the damages caused by the second assessment. —Crowley v. City of Milwaukee, 164 N. W. 833.

Planking on Street—Sound Practice—Liability.

(N. Y. Sup.) Where street being excavated is planked by contractor for city of New York, under approval and direction of Public Service Commission and in accordance with sound engineering practice, one injured by breaking through must show actual or constructive notice of defect in plank.—Schmidt v. City of New York, 167 N. Y. 23.

Parks—Not Governmental Function.

(Idaho) The care and maintenance of parks is primarily a private, as opposed to a governmental, function.—Boise Development Co. v. Boise City, 167 P. 1032.

Police Power—Abating Nuisances.

(Iowa) The power conferred by Code Supp. 1913, §696, authorizing municipal corporations to abate nuisances, can be exercised only in accordance with ordinance regularly and legally adopted.—Wilson v. City of Ottumwa, 164 N. W. 613.

Police Power—Sunday "Movies."

(Tex. Cr. App.) Ordinance allowing a moving picture show to remain open on Sunday cannot suspend Pen. Code 1911, art. 302, prohibiting them to run on Sunday with certain films.—Zucarro v. State, 197 S. W. 982.

Survey Line—Location of Property.

(Ill.) If line of section as run by government surveyor is not coincident with line run by surveyors employed by owners of property to lay out plats, right of owners is not lessened to locate street and line of survey, so far as they own property, at point where it is located in surveyors' plats.—Wolpert v. City of Chicago, 117 N. E. 447.

Police Power—Requiring Monthly Statements.

(Ky.) Ordinance requiring monthly statements of business from money lenders held invalid, and not within police powers.—Salisbury v. Equitable Purchasing Co., 197 S. W. 813.

Exemption for Sewer Assessments—Grounds.

(Ohio) Owner of abutting lot, claiming its exemption from sewer construction assessment on ground that it is provided with a local drainage, has burden of showing that such drainage is adequate for surface drainage and the usual purpose of sewerage.—City of Cincinnati v. Polster, 117 N. E. 155.

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

March 13.—VERMONT SOCIETY OF ENGINEERS. Annual meeting, Burlington. Secretary-treasurer, Geo. A. Reed, Montpelier, Vt.

May 13-17.—AMERICAN WATER WORKS ASSOCIATION. Annual convention, St. Louis, Mo. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d street, New York, N. Y.

April 15, 16.—SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION. Annual convention, Galveston, Tex. Secretary, H. S. Cooper, Dallas, Tex.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-20.—SOUTHWESTERN SOCIETY OF ENGINEERS. Annual convention, Douglas, Bisbee and Tucson, Ariz. Secretary, C. E. Barglebaugh, El Paso, Tex.

April 23-26.—SOUTHWESTERN WATER WORKS ASSOCIATION. Seventh annual convention, Tulsa, Okla. Secretary-treasurer, E. L. Fulkerson, Waco, Tex.

New England Water Works Association.

The standard specifications for cast-iron pipe of the American Water Works Association were considered at the Feb. 13 meeting of the New England Water Works Association in Boston. In accord with the recommendation of the national society's committee and the New England committee, copies of the specifications had been printed and distributed to all members.

A questionnaire is to be sent out asking whether the members approve the details in the specifications in the matter of (1) adoption of uniform outside diameter; (2) chemical requirements of the metal, and (3) relation between flexure and breaking load. It is understood that no change will be made in the standard specifications for pipe and specials until after the war and, after that, a resonable period to allow the manufacturers to change their equipment.

Chairman F. A. Innes, of the committee, urged that the manufacturers give definite information of the cost of making changes in patterns and molds to produce the uniform outside diameter for all classes of pipe of a given nominal size. All speakers, except the representatives of the manufacturers, approved uniformity in outside diameter. The standard specifications recently adopted by the British Institution of Water Works Engineers call for the uniform external diameter, and this was frequently pointed out.

Charles R. Wood, who represented the manufacturers, said that they would comply with the new specifications when they were convinced of a real demand by consumers, but that at present pipe users were satisfied with existing specifications and that a change would be a waste of money and energy. He also asked that the manufacturers be allowed to submit suggestions for additional questions in the questionnaire.

J. M. Diven, secretary of the national association, urged that the questionnaire be sent to the membership of both associations, suggesting that even if the new requirements were not adopted, there should be a revision and reconciliation of the two sets of specifications, to obtain a single standard.

Alfred O. Doane, division engineer of the Metropolitan water works, Boston, read a short paper on pumping engines, development and comparative characteristics.

Dominion Association of Fire Chiefs.

The president of the Dominion Association of Fire Chiefs will shortly call a meeting of the board of directors to arrange for holding the tenth annual convention in the city of Toronto, Ont. Suggestions as to topics for discussion, or any other business, as well as to the date of convention, will be welcomed by the board. All communications in this respect are to reach the secretary not later than March 15. It has already been suggested that the convention be held during the first week of the Toronto Exhibition.

That the work and influence of the association may be extended, it is considered desirable that a complete list of the names of all fire chiefs in Canada shall be on file in the office of the secretary. All are asked to help in having this done by sending in the name of every chief who is not at present a member of the association.

Southwestern Society of Engineers.

A "traveling meeting" will be the form taken by the annual convention of the Southwestern Society of Engineers, held April 18, 19 and 20. The delegates will meet for one day in each of three cities of Douglas, Bisbee and Tucson, travelling at night and convening in the day time.

The directors of the association, who recently met in El Paso, Tex., chose the following officers: President, G. M. Butler, Tucson, Ariz.; first vice-president, S. H. Worrell, El Paso; second vice-president, Gerald Sherman, Bisbee, Ariz.; treasurer, R. W. Goddard, State College, N. M.; secretary, C. E. Barglebaugh, El Paso.

Engineers' Club of Kansas City.

The sixth annual dinner of the Engineers' Club of Kansas City, Mo., held Jan. 29, was attended by over two hundred members. Officers elected for the coming year were: President, Alfred Hurlburt; first vice-president, F. B. Scheetz; second vice-president, A. C. Everham; secretary, Robert S. Beard; executive committee, H. B. Treadway, Ralph R. Benedict and William Bugg.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Worth county drainage district, Grant City, Mo., is to engaged in extensive FLOOD PREVENTION improvements. Plans for the work are in the hands of the Clarke E. Jacoby Engineering Co.

PAVING IMPROVEMENTS are to be made by La Grange, Ill., plans for the work having been completed by E. L. Hancock.

Barberton, O., is to build a SANITARY SEWER SYSTEM to cost about $85,000. The city's consulting engineer for the project is R. Winthrop Pratt.

A FILTRATION PLANT is to be built by Evans City, Pa. Plans are in course of preparation by the engineer, P. H. Martin.

Jeffersonville, Ga., proposes to issue bonds for the construction of ELECTRIC LIGHT and WATER SYSTEMS. The engineer for the work is W. H. Goodlow.

A bond issue is soon to be voted on for the construction of WATERWORKS for Gaylord, Kan. Preliminary plans for the improvement have been prepared by the engineer, G. P. Taylor.

Twin Falls, Ida., is to improve its WATER SYSTEM at a cost of $375,000. Plans for the improvement are being prepared by the engineering firm of Burns & McDonnell.

SEWER EXTENSIONS are to be built by Woodbury, N. J. The engineer for the work is Wm. H. Boardman.

A SEWER SYSTEM is to be built by Wilton, N. D., plans and specifications having been completed by the engineer, T. R. Atkinson.

THE WATERWORKS SYSTEM of Rush City, Minn., is to be improved. The engineer for the work is Frederick Bass.

STREET IMPROVEMENTS are to be made by Moorestown, N. J. The engineering firm of Haines & Sherman, will have charge of the plans for the work.

The city commissioners have been investigating the manner in which the Public Service Corporation has been fulfilling its STREET LIGHTING CONTRACT. The city's consulting gas engineer, Willard D. Hine, has completed a report on the conditions.

INDUSTRIAL NEWS

Cast Iron Pipe.—Government prices remain constant, but there is a tendency to cut about $2 a ton on 6-inch and $1.50 on 4-inch where business is competitive. Quotations: Chicago, 4-inch, class B and heavier, $57.30; 6-inch, $54.30. New York, 4-inch, class B and heavier, $58.35; 6-inch, $55.35; 3-inch, $65.35. Birmingham, 4-inch, class B and heavier, $52; 6-inch, $49; class A $1 extra.

Army Engineers Want Catalogs.—John J. Huber, Acting Adjutant, 2nd Battalion, special highway regiment, 23rd Engineers, Laurel, Md., wants a file of catalogs of road, quarry and bridge machinery and equipment. Five copies of all catalogs are requested.

Construction Materials Situation.

Navy demands as shown by actual New York orders placed in the last two weeks give evidence that other building materials are going to have a market here this year far greater than that heretofore conceived. Rear Admiral Haliday came from Washington when a complaint from a large company reached the Navy Department that the market was held so high that it was unable to avoid delays in important construction work. A conference of crushed stone and gravel men was called, and the proposition was made for gravel to be mined and shipped at a certain upset price below the current wholesale list. The gravel men protested that such a proceeding would be confiscatory. It was announced that the Navy Department would be first in the market for 600,000,000 yards of three-quarter inch gravel, and that after its needs were supplied a great deal more would be needed by the army and other departments.

The price was not divulged for publication, but it was below the prices named for private needs. Companies were cautioned not to contract to private consumers unless Government requirements were provided for. At the same conference the navy officials questioned the crushed stone interests and stated that 1,000,000 yards of crushed stone would be required, but in this department that would leave a like amount available for private needs, because the quarries in this vicinity can turn out about 2,500,000 yards a season. Approximately 500,000 yards have already been contracted. Prices for crushed stone and gravel have both gone up. Current quotations now rule for three-quarter-inch gravel at from $1.80 to $1.90 a yard, wholesale, New York, to private operations, and on crushed trap rock and blue stone about the same levels prevail. One year ago at this time the price for gravel was $1 a yard, and blue stone $1.10. Trap rock was at that time $1.15.

Simultaneous with this shift in the concrete ingredient market a large part of the membership of the Executive Committee of the Portland Cement Association met at the Biltmore, in New York city, with B. F. Afleck, the president. There are only a few of the Portland cement plants in the Lehigh district that are operating now, the major part of them being closed down because of lack of coal at a time when concrete and cement demand is at its height with hardly any reserves on hand not now contracted for. The surplus on hand early in January has practically entirely disappeared.

The records of the bridge builders and Structural Society as collected by George E. Gifford, secretary, show that during the month of January 53 per cent of the bridge and structural shops of the country was contracted for.

In the asphaltum market there is still a great deal of difficulty in obtaining supplies.

The lime and plaster departments production is hampered by lack of labor and fuel.

National Lime Manufacturers' Association.—The annual convention of the assocation has been postponed until April 3 and 4. It was to have been held in the beginning of this month in Chicago.

Highway Industries Association.

The Highway Industries Association, which was organized recently in Chicago, was completely organized at a meeting of the officers and board of directors held in Washington Feb. 15. The member organizations have approved the nomination of their representatives on the board of directors.

The officers of the association are now as follows: Executive Committee (all directors), A. P. Sandles, National Crushed Stone Manufacturers' Assn.; E. J. Rutherford, general sales manager, Goodrich Tire Co., Motor Car and Accessories Manufacturers' Assn.; A. N. Johnston, Portland Cement Association; W. P. Blair, National Paving Manufacturers' Association; Winsor T. White, motor truck branch, National Automobile Chamber of Commerce. The following officers are also directors and ex-officio members of the executive committee: President, S. M. Williams, general sales manager, Garford Motor Truck Co.; vice-president, A. R. Hirst, state highway engineer of Wisconsin; vice-president, E. J. Mehren, editor of Engineering News-Record, succeeding Lion Gardiner, resigned; vice-president, S. T. Henry, vice-president, Allied Construction Machinery Corporation.

The other directors of the association are: H. J. Love, National Stone Association; E. G. Sutton, National Association of Sand and Gravel Producers; S. J. Morrison, National Association of Asphalt Block Manufacturers; S. T. Beatty, National Association of Road Machinery Manufacturers; W. E. Metzgar, motor car branch of the National Automobile Chamber of Commerce.

Offices are being established in Washington and a program, following suggestions by the American Association of State Highway Officials and government bodies, is being developed. It is estimated that the industries so far represented in the association have a total capitalization amounting to more than $2,000,000,000. The companies employ over 1,000,000 persons.

PERSONALS

The following are new officials:

New Haven, Conn.—Permanent paving board, Charles M. Costello; health department, Dr. William T. Butler; police commission, P. George Nicolari and Daniel J. Hurley; fire commission, Thomas C. Bracken, Lawrence E. Reif and Col. George D. Post; public parks, John H. Shaw, Harry W. Hitchcock and Henry Griswold.

Titusville, Pa.—Mayor, Charles B. Morgan; supt. finance and accounts, T. U. Smith; supt. parks and public property, L. O. Bradley; supt. streets and public improvements, John G. Marron; supt. public safety, John Blinzig; city clerk, W. M. Dame; city engineer, Karl R. Kightlinger; fire chief, Allie Longtine; police chief, Herbert S. Edwards.

Oil City, Pa.—Mayor, William Agnew; city clerk, William W. Holt; city engineer, B. B. Weber; commission council, A. W. Kinney, A. B. Burns, H. G. McKnight, D. K. Johnson; street commissioner, A. J. Short; chief of police, Edward Nugent; fire chief, Albert G. Dolby; health officer, E. M. Voorheis.

Biloxi, Miss.—Supt. waterworks, Joseph Tucci; health department, Dr. W. T. Bolton; sanitary inspector, Robert Michel.

Vincennes, Ind.—Mayor, Dr. James D. McDowell; city clerk, C. L. V. Tucker; chief of police, H. F. Jones; city engineer, J. S. Spiker; board of public works, George W. Donaldson; fire chief, Jerry Hedden.

Utica, N. Y.—City engineer, Joseph Kemper; commissioner of public safety, Joseph Hamlin; commissioner of public works, Harry R. Hayes.

Rahway, N. J.—Mayor, David H. Trembly; commissioners, David Armstrong and James B. Furber.

Pottsville, Pa.—Mayor, F. P. Mortimer; director public safety, J. O. Bearstler; director public property, Geo. J. Smith; city clerk, G. A. Berner; fire chief, W. L. Stevenson; director streets and public improvements, Joseph H. Nichter; director finance and accounts, George W. Jungkirth; city engineer, W. S. Pugh; road foreman, James A. Lynaugh.

Auburn, N. Y.—City engineer, Thomas B. Bergan; police commissioner, George F. Sweet; commissioner of public works, Dr. Louis E. Jenkins; fire commissioner, Dennis J. Sweeney; park commissioner, Frank H. Armstrong; commissioner of health, Albert H. Nichols.